

Chapter 5, Section 5.3 Status and Recovery Salmon River Steelhead Major Population Group in the Snake River Steelhead DPS

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5.3 Salmon River MPG

The Salmon River MPG consists of steelhead returning to the Salmon River subbasin. The MPG supports twelve independent populations (ICTRT 2003) and all are considered extant (Figure 5.3-1, Table 5.3-1). Eight of the populations are classified as supporting A-run steelhead and four are classified as supporting B-run steelhead. Population size designations, based on intrinsic potential habitat are basic and intermediate. Characteristics of the populations as defined by the ICTRT are listed in Table 5.3-1.

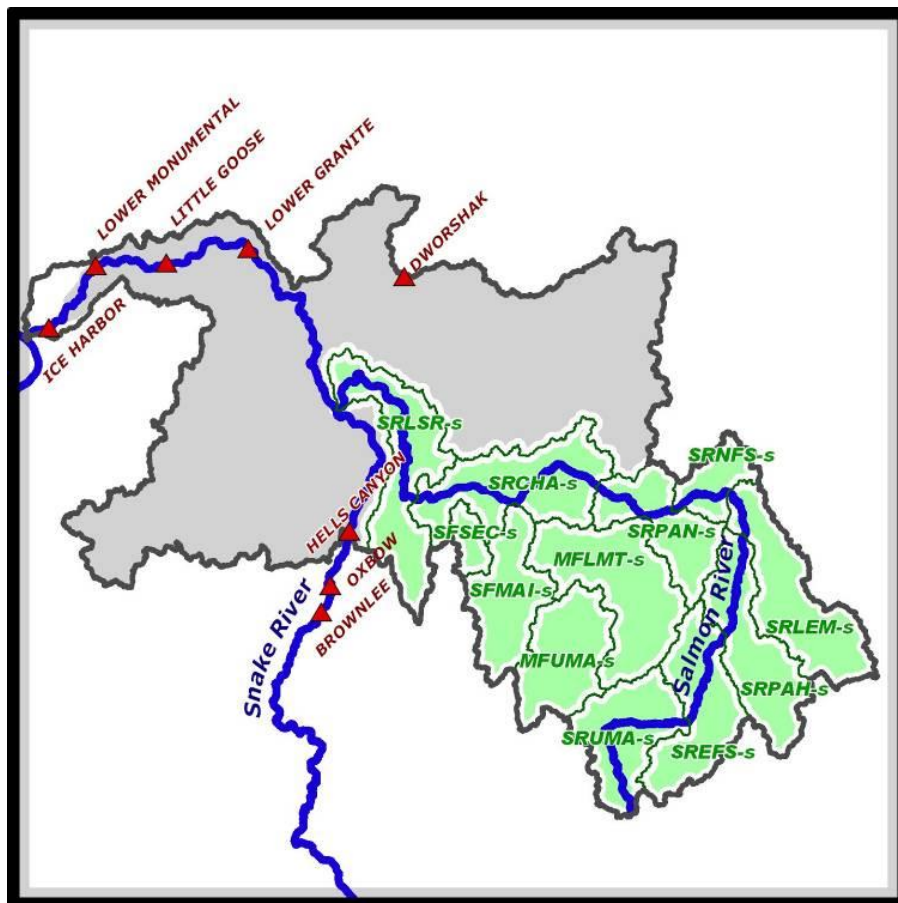


Figure 5.3-1. Salmon River steelhead MPG and populations. See Table 1 for Map Population Codes.

Hatchery steelheads are released at locations within the Salmon River steelhead MPG for supplementation purposes. Numbers of fish to be released and release locations are determined through U.S. v. Oregon negotiations. Target annual release numbers for brood years 2006-2008 at all locations in the Salmon River drainage sum to 730,000 smolts, of which 530,000 are not adipose-clipped. Approximately one million steelhead eyed-eggs are outplanted annually in addition to the supplementation smolt releases. The Secesh River population (in the South Fork Salmon River drainage), the two Middle Fork Salmon River populations, and the Chamberlain Creek population have no history of hatchery steelhead releases and are managed for natural-origin production. More detailed descriptions of population-level hatchery effects are described for the individual populations in Section 5.3.6.

Table 5.3-1. Salmon River steelhead MPG population characteristics. Minimum abundance and productivity values represent levels needed to achieve a 95% probability of existence over 100 years (ICTRT 2007).

Population	Extant/ Extinct	Size	Minimum Threshold	Minimum Productivity	Life History
Little Salmon R. (SRLSR)	Extant	Basic	500	1.27	A-Run
South Fork Salmon R. (SFMAI)	Extant	Intermediate	1,000	1.14	B-Run
Secesh R. (SFSEC)	Extant	Basic	500	1.27	B-Run
Chamberlain Creek (SRCHAM)	Extant	Basic	500	1.27	A-Run
Lower Middle Fork Salmon R. (MFLMT)	Extant	Intermediate	1,000	1.14	B-Run
Upper Middle Fork Salmon R. (MFUMA)	Extant	Intermediate	1,000	1.14	B-Run
Panther Creek (SRPAN)	Extant	Basic	500	1.27	A-Run
North Fork Salmon R. (SRNFS)	Extant	Basic	500	1.27	A-Run
Lemhi R. (SRLEM)	Extant	Intermediate	1,000	1.14	A-Run
Pahsimeroi R. (SRPAH)	Extant	Intermediate	1,000	1.14	A-Run
East Fork Salmon R. (SREFSR)	Extant	Intermediate	1,000	1.14	A-Run
Upper Main. Salmon R. (SRUMA)	Extant	Intermediate	1,000	1.14	A-Run

5.3.1 Viable MPG Scenarios

The ICTRT incorporated the viability criteria (ICTRT 2008) into viable recovery scenarios for each MPG. The criteria, which are explained in detail in Chapter 3, Recovery Goal and Delisting Criteria, should be met for a MPG to be considered viable, or low risk, and thus contribute to the larger objective of species' viability. These criteria are:

1. At least one-half the populations historically present (minimum of two populations) should meet viability criteria (5% or less risk of extinction over 100 years).
2. At least one population should be highly viable (less than 1% risk).
3. Viable populations within a MPG should include some populations classified as "Very Large" or "Large," and "Intermediate" reflecting proportions historically present.
4. All major life history strategies historically present should be represented among the populations that meet viability criteria.
5. Remaining populations within an MPG should be maintained (less than 25% risk) with sufficient abundance, productivity, spatial structure and diversity to provide for ecological functions and to preserve options for species' recovery.

The criteria suggest several viable MPG scenarios for the Salmon River MPG:

- Since there are twelve steelhead populations in the Salmon River MPG, at least six must be Viable (low risk) for the MPG to be viable. One of these populations must achieve Highly Viable (very low risk) status
- At least four of the six viable populations must be Intermediate size.
- At least two of the six viable populations need to be B-run populations so that all major life histories are represented. Also, because the geographic area of this MPG is so large, it is important that spatial distribution of the viable populations be considered.
- All remaining populations should at least achieve maintained status.

5.3.2 Current MPG Status

The ICTRT used the viability criteria to determine the current status of the MPG. The ICTRT completed status assessments for all populations in the MPG, which inform the MPG-level criteria. A population's current status is the cumulative risk resulting from the population's abundance, productivity, spatial structure and diversity risks. The abundance/productivity risk assessment for steelhead populations is problematic because of the lack of population level abundance data for most populations. Pending the collection of better population abundance data, the ICTRT developed generic abundance/productivity risk assessments for an average A-run and B-run steelhead population. That methodology allocated the aggregate run of natural-origin steelhead at Lower Granite Dam to the various populations. Currently, the Salmon River steelhead MPG does not meet the MPG-level viability criteria. All 12 populations are at moderate or high abundance/productivity risk (Table 5.3-2).

Table 5.3-2. Viable Salmonid Population (VSP) risk matrix for independent populations in the Salmon River steelhead MPG with current status, as determined from ICTRT population viability assessments.

		Spatial Structure/Diversity Risk			
		Very Low	Low	Moderate	High
Abundance/ Productivity Risk	Very Low (<1%)	VL	VL	L	M
	Low (1-5%)	L	L	L	M
	Moderate (6 – 25%)	M	M	M Little Salmon North Fork Lemhi Pahsimeroi East Fork Upper Main.	HR Panther
	High (>25%)	HR	HR South Fork Secesh Chamberlain Lower Mid Fork Upper Mid Fork	HR	HR

Viability Key: HV – Highly Viable; V – Viable; M – Maintained; and HR – High Risk; shaded cells – do not meet viability criteria, with darkest cells signifying the highest risk of extinction. Percentages refer to risk of extinction over 100 years.

5.3.3 Viability Gap

A population's gap represents the improvements in abundance (the total number of adults) and productivity (the ratio of returning adults to the parental spawning adults) that are necessary for a population to achieve its desired status. As such, the gap is a good indicator of the level of effort needed to achieve recovery.

Gaps are measured as the necessary improvement in survival rates. More information can be found in ICTRT (2007b) regarding how the required survival changes were calculated. For each population the ICTRT quantified gaps as necessary changes in survival rates to achieve three different extinction risk levels: very low risk (Highly Viable), low risk (Viable), and moderate risk (Maintained). For each risk level, the gap is expressed as a range based on favorable and unfavorable ocean conditions, to account for uncertainty about future climate and ocean conditions.

[Section is under development]

5.3.4 MPG Limiting Factors and Threats

Many limiting factors and threats affect the viability of Idaho's Snake River steelhead during their complex, wide-ranging life cycle. NMFS defines limiting factors as the biological and physical conditions that limit a species' viability (e.g., high water temperature) and threats as those human activities or natural processes that cause the limiting factors. While the term 'threats' may carry a negative connotation, these are often legitimate and necessary human activities that may at times have unintended negative consequences on fish populations. Adjusting such activities can often minimize or eliminate the negative impacts.

Discussions for individual Salmon River steelhead MPG populations in Section 5.3.6 describe local-level limiting factors and threats, which generally occur in a population area and are specific to a population. Section 5.1.1 summarizes the generally downstream, or regional-level factors, that influence all Idaho Snake River steelhead populations. These factors usually apply to all Idaho Snake River steelhead MPGs and populations in a similar manner because they affect the populations in the mainstem Snake and Columbia Rivers, the estuary, and the ocean. The section also discusses impacts from climate change.

5.3.4.1 Natal Habitat Alteration

[To be developed.]

5.3.4.2 Hatchery Programs

[To be developed]

5.3.4.3 Fisheries Management

[To be developed]

5.3.5 MPG Recovery Strategy

5.3.5.1 Desired Population Status

There are multiple viable scenarios for the Salmon River MPG, as described in Section 5.3.1. To provide focus for this recovery plan, NMFS and the state of Idaho have selected a desired status for each population, matching one of the viable MPG scenarios. The selections are described below and shown in Table 5.3-3. It is important to note, however, that any viable MPG scenario satisfying the criterion in 5.3.1 is acceptable for achieving the recovery goal for the MPG.

South Fork Salmon River

The South Fork Salmon River population is one of seven intermediate-sized populations, at least four of which must meet viable status. It is also one of four B-run populations in the MPG, at least two of which must be viable. The population has had very little hatchery influence. Habitat was degraded by past intensive land uses but has since shown signs of recovery and the stream network now functions largely as a natural system. Located at the downstream end of the MPG, this population will provide geographic distribution of viable populations. For these reasons, the desired status for this population is **Viable**, with a low (1-5%) risk of extinction over 100 years.

Chamberlain Creek

The Chamberlain Creek population is one of seven intermediate-sized populations, at least four of which must meet viable status. This A-run population has had very little hatchery influence historically and functions as a natural system largely within the wilderness boundaries. The population also provides connectivity between populations in the South Fork, Middle Fork, and Upper Salmon River drainages. The desired status of this population is therefore **Viable**, with a low risk of extinction.

Lower Middle Fork Salmon River

This population will help meet the requirement for four intermediate-sized populations. It is a B-run population. It has had very little hatchery influence and functions largely as a natural system within the wilderness boundaries. This population is targeted to achieve a desired status of **Highly Viable**, with very low (less than 1%) risk of extinction over 100 years.

Upper Middle Fork Salmon River

The Upper Middle Fork Salmon population is an intermediate-sized, B-run population. It has had very little hatchery influence and functions largely as a natural system within the wilderness boundaries. Habitat is in very good conditions, and there should be few development pressures in the future since the area is protected as wilderness. The desired status for this population **Viable**, with low extinction risk.

Panther Creek

Panther Creek is a basic-sized population, with an A-run life history. The population has had some hatchery influence, likely from out of MPG stocks, and the habitat was substantially impacted by past mining activity. However, habitat conditions have been improving in recent decades and this drainage has the potential to become very productive again. The watershed is largely federally-owned, such that the habitat is well protected from development pressure. There are far fewer water withdrawals than in other populations upstream from the Middle Fork Salmon River. The desired status for this population is **Viable**.

Lemhi River

This population is an intermediate-sized, A-run population. Although the population has been impacted by human land uses, many projects have been completed or are underway to improve stream habitat conditions and to reconnect tributaries to the mainstem Lemhi River, reestablishing access for steelhead to tributary habitat. There has been some hatchery influence to the population in the past, but currently no active supplementation occurs. This population occupies the eastern boundary of the MPG and would provide geographic distribution in the Upper Salmon River for viable populations. The desired status for this population is ***Viable***.

Little Salmon River

This basic-sized, A-run population has experienced substantial impacts to habitat from human land uses and has historically had hatchery fish from outside the MPG released into the system. For these reasons, the desired status for the population is ***Maintained***, with only a moderate (25% or less) risk of extinction over 100 years.

Secesh River

Secesh River is a basic-sized population, with a B-run life history. It has had very little hatchery influence in the past and functions largely as a natural system. The watershed is almost entirely in federal ownership but some floodplain development is occurring on private inholdings. Although this population is a good candidate for reaching viability, the South Fork Salmon River population (chosen above for Viable status) encompasses all other watersheds in the South Fork subbasin, providing geographic and life history representation for this MPG. The desired status for this population is ***Maintained***, with only a moderate extinction risk.

North Fork Salmon River

This population is basic-sized, with an A-run life history. The habitat has been affected by human disturbance, and out-of-MPG hatchery steelhead were released into the North Fork between 1977 and 1994. The desired status for the population is ***Maintained***, with only a moderate extinction risk.

Pahsimeroi River

The Pahsimeroi is an intermediate-sized population, with an A-run life history. It has been substantially affected by human land uses, but habitat conditions have improved in some reaches following restoration work in recent years. However, there is an active hatchery supplementation program in the watershed. The desired status for this population is ***Maintained***, with only a moderate extinction risk. This will accommodate some degree of hatchery impact to the population.

East Fork Salmon River

This population is basic-sized, with an A-run life history. Habitat has been impacted by human land uses and there has been hatchery supplementation of this population. The desired status is ***Maintained***, with only a moderate extinction risk.

Upper Mainstem Salmon River

The Upper Mainstem Salmon is an intermediate-sized population, with an A-run life history. It has been impacted by human land uses, but habitat restoration projects are ongoing. However, there is an active hatchery supplementation program in the watershed. The desired status for this population is

Maintained, with only a moderate extinction risk. This will accommodate some degree of hatchery impact to the population.

If each population achieves its desired status, shown in Table 5.3-3, the Salmon River steelhead MPG will be viable.

Table 5.3-3. Viable Salmonid Population (VSP) risk matrix for independent salmonid populations in the Salmon River steelhead MPG, with desired status shown for each population.

		Spatial Structure/Diversity Risk			
		Very Low	Low	Moderate	High
Abundance/ Productivity Risk	Very Low (<1%)	HV	HV Lower Mid Fork	V	M
	Low (1-5%)	V	V South Fork Chamberlain Upper Mid Fork	V Panther Lemhi	M
	Moderate (6 – 25%)	M	M Secesh	M Little Salmon North Fork Pahsimeroi East Fork Upper Main.	HR
	High (>25%)	HR	HR	HR	HR

Viability Key: HV – Highly Viable; V – Viable; M – Maintained; and HR – High Risk; shaded cells – do not meet viability criteria, with darkest cells signifying the highest risk of extinction. Percentages refer to risk of extinction over 100 years.

5.3.5.2 Recovery Strategies and Priority Actions

The recovery strategy for the Middle Fork Salmon River MPG increases abundance and productivity for all populations. The VSP risk matrix (Table 5.3-3 and Table 5.3-4) shows that some populations require a decrease in abundance/productivity risk to reach their desired status of highly viable (very low risk), viable (low risk), or maintained (moderate risk). Because of the uncertainty in the abundance/productivity risk rating for Idaho steelhead populations, increases in abundance and productivity may be necessary for all populations in this MPG. The current spatial structure and diversity risks, on the other hand, are acceptable for all populations in this MPG to attain the desired status, except Panther Creek. The Panther Creek population diversity risk can be decreased by reconnecting the major spawning area in the upper Panther Creek drainage. This area was disconnected by historic mining activities and the remediation work to reconnect the habitat is in the final phases.

Increases in population and MPG abundance and productivity will come from the cumulative positive impacts of recovery actions targeting every life stage.

Natal Habitat

The Frank Church Wilderness covers a large section of this MPG, including most of the Upper Middle Fork Salmon River, Lower Middle Fork Salmon River, and Chamberlin Creek populations, and parts of the South Fork Salmon River and Panther Creek populations. The remaining habitat in these

populations is predominately under federal management, and habitat conditions are improving as a result of actions in existing federal land management plans. Habitat in the other populations in this MPG, on the other hand, continues to be impacted by various land uses.

The priority spawning and rearing habitat recovery actions in this MPG are:

1. Collect and analyze population-specific data to accurately determine the population status.
2. Increase flow levels to eliminate barriers, reconnect tributaries, and to increase the productivity of the habitat.
3. Remove fish barriers including road crossings and irrigation diversion structures.
4. Make sure that existing diversions are properly screened to avoid entrainment of smolts.

Natal habitat actions alone will not produce the increases in survival needed for this MPG to achieve viability. Additional survival improvements from actions taken downstream of the spawning habitat in the Salmon, Snake and Columbia River migration corridor, the Columbia River estuary, or the ocean are a very high priority.

Hatchery Programs

[To be added]

Fisheries Management

[To be added]

5.3.6 Population Summaries

The following sections summarize the results of the population viability assessments completed for the twelve independent populations in the MPG. Also included for each population is a description of habitat conditions and threats to the population, limiting factors assessment, and recovery strategy for the population.

5.3.6.1 South Fork Salmon River Steelhead Population

Abstract/Overview

The South Fork Salmon River steelhead population is currently rated as not viable, with a high abundance/productivity risk. The ICTRT used a surrogate B-run population to estimate the current status of this population because population-specific abundance estimates are currently unavailable. Based on the information, The ICTRT rated the South Fork Salmon population at high risk. The South Fork Salmon population is targeted to achieve a desired status of Viable, which requires a minimum of low abundance/productivity risk. The overall spatial structure and diversity rating is sufficiently low for the population to reach its desired status.

Current Status	Desired Status
High Risk	Viable

The actions identified in this recovery plan to occur over the next 10 years will likely move this population to maintained, but additional actions will be needed for the population to achieve its desired status of viable. Opportunities for improving survival beyond the short-term actions identified in this recovery plan may occur in all habitat types including spawning and rearing habitat, migration habitat and in the estuary. Some of these additional recovery actions may be identified and implemented in the near term; however, the major opportunity for identifying additional actions to increase survival will occur after the analysis of the information being collected during the ten-year term of the 2008 FCRPS Opinion, the U.S. v. Oregon agreement, and the Pacific Salmon Treaty. The monitoring and research information collected during this ten-year period, particularly in the mainstem rivers, will provide an important opportunity to complete a more detailed evaluation of the status of the species and will provide additional knowledge to guide the next round of actions under this recovery plan.

Currently, there is a high degree of uncertainty in estimating the nature and timing of a population's response to various recovery strategies, determining the gap between the current status and the desired status, and determining the amount of improvement necessary to achieve the viability target for this population. Due to this uncertainty, it is important to implement an adaptive management strategy, in conjunction with the ESA's five-year status reviews and the actions described in the Research, Monitoring, and Evaluation chapter. If the initial actions do not produce the intended response, the actions will be adjusted to produce the additional needed improvement.

Introduction

This section of the recovery plan compares the population's desired status to its current status, and describes how the population fits into the recovery strategy for the MPG and DPS. The primary sources of information are the ICTRT viability criteria (NMFS 2007b) and the ICTRT's Snake River steelhead status assessment (ICTRT 2008).

Population Status

The Population Status section describes the population's current status as defined in the ICTRT's most current status assessment (ICTRT 2008) where they discussed risk in terms of four viability parameters: Abundance, Productivity, Spatial Structure and Diversity. Other available information was also considered. The section focuses primarily on population Abundance (the total number of adults) and Productivity (the ratio of returning adults to the parental spawning adults). It compares the population's current status to the desired status in terms of both abundance and productivity. It also

summarizes Spatial Structure (the amount and nature of available habitat) and Diversity (genetic traits) concerns identified by the ICTRT. Diversity concerns are also discussed in the hatchery section. More details are available in the Snake River steelhead status assessment (ICTRT 2008).

Population Description: The South Fork Salmon River population consists of the South Fork Salmon River and all of its tributaries, except the Secesh River (Figure 5.3-2). Spawning areas in the South Fork Salmon River basin are geographically well separated from other spawning aggregates in the Salmon River. Genetic samples from the South Fork Salmon River, however, are distinct from those in the Secesh, leading to the separation of these two populations. The South Fork Salmon River population is a B-run population.

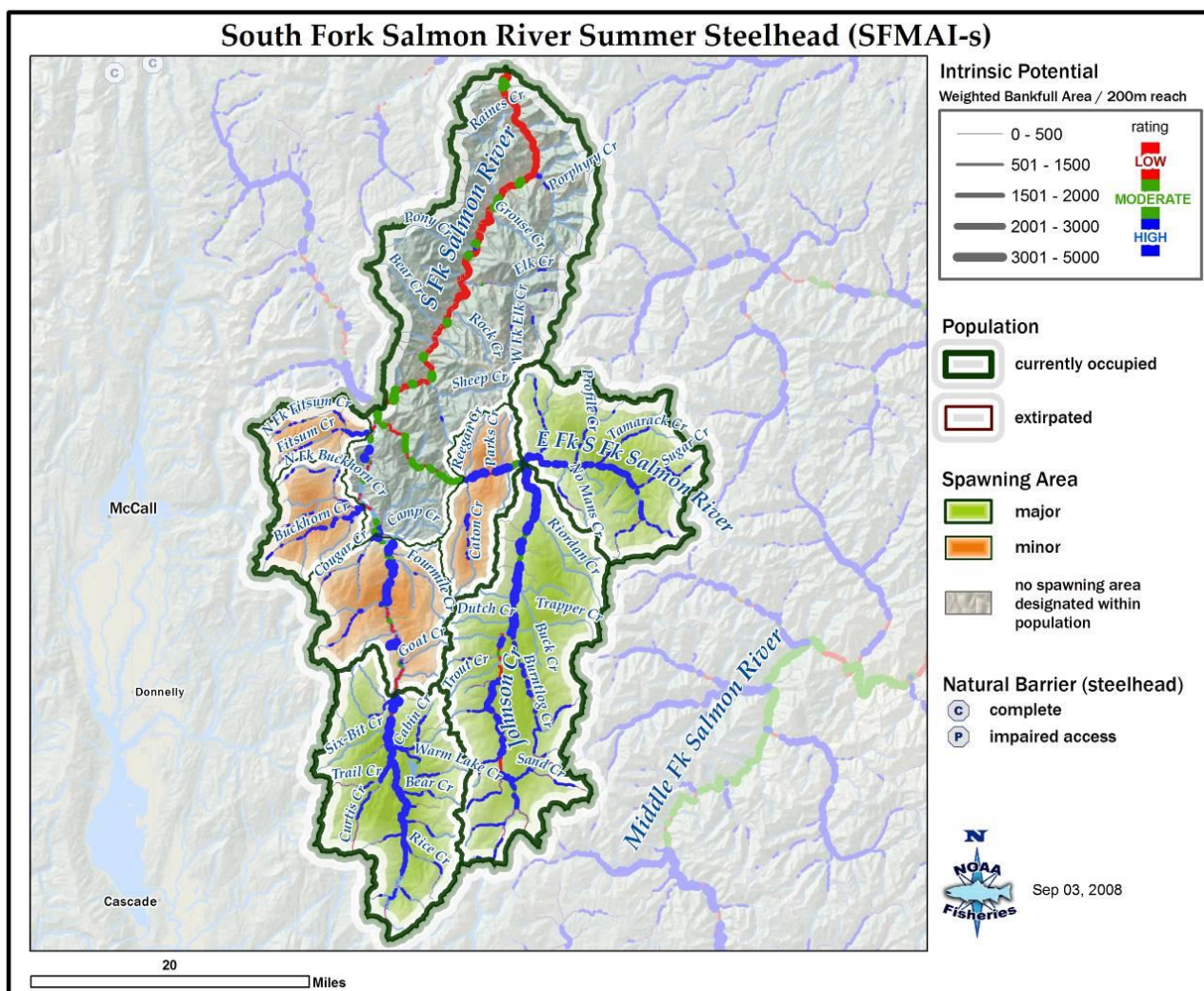


Figure 5.3-2. South Fork Salmon River steelhead population boundary, with major and minor spawning areas.

The ICTRT classified the South Fork Salmon River population as “intermediate” in size and complexity based on historical habitat potential (ICTRT 2007). A steelhead population classified as intermediate has a mean minimum abundance threshold of 1,000 natural-origin spawners with sufficient intrinsic productivity (≥ 1.14 recruits per spawner at the abundance threshold) to achieve a 5 percent or less risk (“low risk”) of extinction over a 100-year timeframe.

Abundance and Productivity: Direct estimates of current abundance are not available for this population. There are no weirs where steelhead escapement for the entire population can be monitored. Steelhead redds, however, were counted by the Idaho Department of Fish and Game (IDFG) in Johnson Creek from 1987 to 1998, and in the mainstem South Fork Salmon River from 1990 to 1998. Not all spawning habitat was surveyed in these transects. From 1991 to 1998, the total number of redds counted each year in five surveyed transects ranged from 30 to 248 (Table 5.3-4).

Table 5.3-4. Steelhead redds counted in South Fork Salmon River drainage transects, 1987-1998. Data obtained from IDFG.

Transect Area	Year								
	1990	1991	1992	1993	1994	1995	1996	1997	1998
Johnson Creek	23	64	27	66	28	29	10	18	10
South Fork - Poverty	62	76	31	75	30	44	32	2	7
South Fork - Darling Cabin	25	39	17	49	25	34	31	14	3
South Fork - Oxbow	37	31	26	34	11	14	2	13	8
South Fork - Krassel		38	8	23	5	15	17	2	2
Total	147	248	109	247	99	136	92	49	30

Because population-specific abundance estimates are not available for most Snake River steelhead populations, the ICTRT generated preliminary estimates of average population abundance and productivity using annual counts of wild steelhead passing Lower Granite Dam. Estimates were developed for two average surrogate populations to represent both major run types (A and B). These abundance and productivity estimates were then compared to a viability curve for an intermediate-sized Snake River steelhead population (requiring a minimum abundance threshold of 1,000 natural-origin spawners and a productivity of 1.14 recruits per spawner). The surrogate population for B-run steelhead above Lower Granite Dam has an estimated recent abundance of 345 and productivity of 1.09. It is rated as high risk based on current abundance and productivity, as shown in Figure 5.3-3. The point estimate representing current status lies just below the 25 percent risk curve for intermediate-sized Snake River steelhead populations, indicating a greater than 25 percent risk of extinction over a 100-year timeframe. More specific information about how the abundance and productivity estimates were calculated is included in the ICTRT's steelhead status assessment Appendix B-1 *Calculating Representative Abundance and Productivity Estimates for Snake River A and B run Steelhead Populations*.

Based on the surrogate B-run population, the ICTRT gave the South Fork Salmon River population a tentative abundance/productivity rating of high risk.

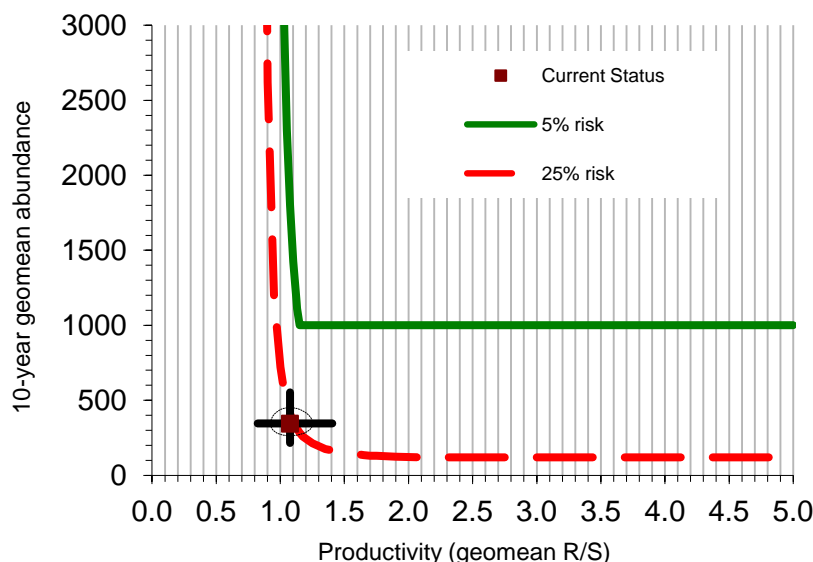


Figure 5.3-3. Snake River B-run surrogate steelhead population current estimated abundance/productivity (A/P) compared to DPS viability curve (1986-2005). Ellipse = 1 SE about point estimate. Error bars = 90% CI for A, 98% CI for P (if point estimate >1% risk curve, the uncertainty test is <1% probability the combined A/P is at high risk).

Spatial Structure: The ICTRT has identified three major spawning areas (Johnson Creek, Upper East Fork South Fork, and Upper South Fork) and four minor spawning areas (Middle South Fork, Buckhorn Creek, Fitsum Creek, and Lower East Fork South Fork) within this population. Based on juvenile fish surveys, all major and minor spawning areas are currently occupied. The extensive branching of occupied spawning habitat leads to a very low spatial structure risk, which is adequate for the population to reach its desired status of viable.

Diversity: A population's diversity risk rating is a function of multiple metrics that assess the population's major life history strategies, phenotypic variation, genetic variation, spawner status including hatchery and stray influences, and distribution across different habitat types. The major life history strategies historically represented in the population are unknown, but the population is currently classified as consisting only of B-run steelhead. Genetic data suggest that this population is well differentiated from other Salmon River populations, and there is no hatchery program in this population. Cumulative diversity risk is therefore low, with is adequate for the population to meets its desired status.

Summary: The South Fork Salmon River steelhead population is currently at high risk due to a tentative high risk rating for abundance/productivity. A population-specific monitoring program will be necessary to reduce the uncertainty of this rating. In the absence of population-specific abundance data, we assume that a substantial increase in abundance and productivity will be needed for this population to reach its desired status of viable. Table 5.3-5 shows the population's current and desired status in terms of cumulative abundance/productivity and spatial structure/diversity risks. A complete version of the ICTRT's draft status assessment for Snake River Basin steelhead populations is available upon request from NMFS.

Table 5.3-5. South Fork Salmon River population risk ratings integrated across the four viable salmonid population (VSP) metrics. The population does not meet population-level viability criteria.

		Spatial Structure/Diversity Risk			
		Very Low	Low	Moderate	High
Abundance/ Productivity Risk	Very Low (<1%)	HV	HV	V	M
	Low (1-5%)	V	V	V	M
	Moderate (6 – 25%)	M	M	M	HR
	High (>25%)	HR	HR South Fork Salmon River	HR	HR

Viability Key: HV – Highly Viable, V – Viable, M – Maintained, and HR – High Risk; shaded cells – do not meet viability criteria, with darkest cells signifying the highest risk of extinction. Percentages refer to risk of extinction over 100 years. Arrow points to desired risk status.

Limiting Factors and Threats Specific to Population

This section describes the limiting factors and threats that are specific for the population. The population is also affected by limiting factors and threats in the mainstem Columbia/Snake River corridor, estuary, and plume, and by climate change. Section 5.1.1 summarizes regional-level factors that affect all Idaho Snake River steelhead populations.

Natal Habitat

Habitat Conditions: The South Fork Salmon steelhead population includes the South Fork Salmon River and all its tributaries except the Secesh River. The South Fork Salmon River steelhead population contains three major tributaries: the East Fork South Fork Salmon River, Johnson Creek, and the upper South Fork. The South Fork Salmon enters the main Salmon River downstream of the confluence with the Middle Fork Salmon River. The geographic area encompassed within this population has a drainage area of approximately 1,063 square miles (2,752 km²). The drainage is semiarid, with most of the precipitation falling as snow in the higher elevations. Precipitation averages about 31 inches per year, falling mostly as snow. The heaviest precipitation usually falls as snow in November and December. Occasionally, storms move over the area producing warm rainstorms in late fall or early winter. These storms can cause significant rain-on-snow events, resulting in high flows. Peak stream discharge typically occurs during May and June following snowmelt (IDEQ 2002).

Steelhead habitat in the South Fork Salmon is characterized as being in mostly good to excellent quality (NPCC 2004, p 1-36). There are about 1,283 km of stream within the population with about 771 km downstream of natural barriers.

Land ownership within South Fork Salmon River population is primarily U.S. Forest Service (USFS) (99.14%) with state (0.24%), and private (0.62%) combined at less than one percent (Figure 4). The northeast portion of the South Fork Salmon subbasin is located within the boundaries of the Frank Church River-of-No-Return Wilderness. The USFS principally administers the land uses within the South Fork Salmon subbasin. The state lands include state endowment lands and homesteads that the state has purchased. Private land is scattered throughout the watershed and includes working ranches, guest ranches, private residences, recreational facilities, villages and mining sites. Current land uses include mining, timber harvest, grazing, and recreation.

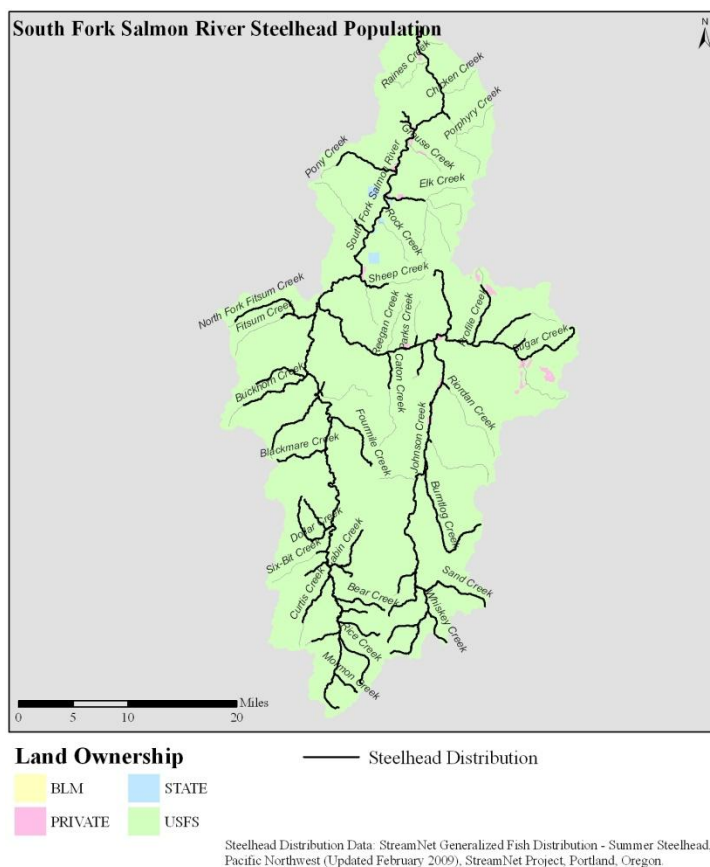


Figure 5.3-4. Land ownership in the South Fork Salmon River steelhead population.

A history of over utilization by sheep within the South Fork Salmon River led to a closure of grazing allotments (IDEQ 2002). Historically, the South Fork Salmon River and Johnson Creek drainages were affected by sheep grazing that occurred from the turn of the century through the early 1960s. Erosion and poor vegetation recovery resulted in a reduction of sheep numbers in the 1950s. In the 1960s, the sheep market crashed and sheep grazing ended. The allotments were shifted from sheep to cattle in the 1960s; however, by 1970 the USFS had eliminated all grazing allotments in the South Fork Salmon subbasin (USFS 1995, as cited by IDEQ 2002). Currently, grazing plays a very minor role in the South Fork Salmon watershed and is associated with permitted outfitter and guide activity on National Forest System lands. Limited grazing occurs on private land near Yellow Pine.

Mining has also played a significant role in the South Fork Salmon subbasin (IDEQ 2002). The alluvial deposits in and along the South Fork and the East Fork South Fork Salmon Rivers, the Upper Secesh River and Johnson Creek were placer mined for gold in late nineteenth century and into recent years. Most placer mining activity was limited in scale. The most extensive mining occurred in the Upper East Fork South Fork Salmon River. Antimony and tungsten were mined at Stibnite from the 1930s through the 1950s. Beginning in the 1970s until 1997, gold was produced from a moderately large surface mine at Stibnite using heap-leach techniques (Griner and Woodward-Cyde 2000, as cited by the Idaho Department of Environmental Quality (IDEQ 2002). Mines at Cinnabar and Fern Creek

produced significant quantities of mercury during the 1940s and 1950s. The greatest amount of activity at Cinnabar Mine occurred during the 1940s and 1950s.

IDEQ (2002) characterized timber harvest activity and associated sediment problems in the South Fork Salmon subbasin. The highest volume of logging activity took place from 1950-1965 with an estimated 147 million board feet. A series of intense storms and rain-on-snow events between 1958 and 1965 created numerous landslides and slumps triggered by logging and associated road construction, inundating the river and some of its tributaries with heavy sediment loads (Platts 1972). Arnold and Lundeen (1968), as cited in IDEQ (2002), estimated in 1965 that about 1.5 million cubic yards (about 7 times the normal load) of sediment was stored in the upper 59 miles of the South Fork Salmon River and its tributaries. The rain on snow events in the winter and spring of 1965 caused over 100 landslides, the majority of which were related to roads. In June 1965, the dam on Blowout Creek failed and an 8-foot surge of flood water, sediment and debris went into Meadow Creek, a tributary to the East Fork South Fork Salmon River. The flood water damaged habitat in the East Fork South Fork Salmon River all the way downstream to Yellow Pine. Concerns over sedimentation and fish habitat resulted in the USFS halting all land disturbing activities in the upper South Fork Salmon River drainage in 1965. Between 1977 and 1982, timber harvest was allowed as long as an annual review of monitoring results showed that fish habitat was continuing to improve. Another moratorium occurred from 1986-1988 due to no improvement in fish habitat. Currently, timber management is limited to sales of utility poles, house logs, post and poles and fuel harvest.

The IDEQ's 2008 Integrated (303(d)/305(b)) Report shows that several stream segments in this population are not fully supporting their assessed beneficial uses (Table 5.3-6). These impaired stream segments are listed under the Clean Water Act, section 5 (impaired waters that need a TMDL), section 4c (waters impaired by non-pollutants), and section 4a (impaired waters than have an EPA-approved TMDL) (IDEQ 2009).

Table 5.3-6. Stream segments in the South Fork Salmon River steelhead population identified from Sections 4a, 4c, and 5 of the IDEQ 2008 303(d)/305(b) integrated report (IDEQ 2009).

Waterbody	Impairment/Cause	Stream Miles
Section 5-303(d)		
East Fork of the South Fork Salmon River - source to mouth	Combined Biota/Habitat Bioassessments*	2.58
East Fork of the South Fork Salmon River - source to mouth	Sedimentation/Siltation	14.47
Johnson Creek - source to mouth	Water temperature	13.09
Section 4c-Waters Impaired by Non-pollutants		
No Listings		0.0
Section 4a-TMDLs		
South Fork Salmon River - East Fork Salmon River to mouth	Sedimentation/Siltation	36.85
SF Salmon River - 3rd order (Curtis Cr. to Mormon Cr.)	Sedimentation/Siltation	13.7
SF Salmon River - 4th order (Curtis Cr. to Buckhorn Cr.)	Sedimentation/Siltation	26.77

*The combined biota/habitat bioassessment cause is assigned to a waterbody on the 303(d) list (Category 5 of the integrated report) when bioassessment scores indicate poor habitat and/or aquatic community conditions and there is insufficient information to determine the cause(s) of the poor bioassessment scores.

Current Habitat Limiting Factors: NMFS determined the habitat limiting factors by reviewing multiple data sources and reports on stream conditions. Based on reports and discussions with local fisheries experts and watershed groups, we conclude that the habitat limiting factors for the South Fork Salmon

steelhead population are sediment, habitat complexity, riparian condition, and migration barriers. Table 5.3-7 summarizes the mechanisms by which each limiting factor affects steelhead, and the management objectives for addressing each limiting factor. This section discusses each limiting factors, using information from USFS reports, IDEQ reports, and the Salmon Subbasin Assessment and Management Plan (USFS 2006; IDEQ 2002, 2009; NPCC 2004; Ecovista 2004).

Table 5.3-7. Primary limiting factors identified for the South Fork Salmon steelhead population, mechanisms by which each limiting factor affects salmonids, and management objectives for addressing each limiting factor.

Limiting Factors	Effects on Salmonids	Management Objectives to Address Limiting Factors
Sediment	Excess sediments can reduce juvenile habitat (rearing), aquatic insect availability (food), and spawning and incubation success (reproduction).	Riparian restoration actions to stabilize streambanks and reduce sedimentation to the stream
Habitat Complexity	Reduced habitat complexity from lack of sufficient LWD reduces pool formation, juvenile rearing, and adult holding.	Riparian restoration to increase habitat complexity and large woody debris recruitment
Riparian Condition	Poor riparian conditions reduce habitat quality, streambank stability (sediment and channel condition), shade (stream temperature), and large woody debris recruitment (habitat complexity and pool formation).	Riparian restoration actions to increase habitat complexity and large woody debris recruitment
Migration Barriers	Migration barriers such as dams, culverts, and dewatered stream sections can create fish passage barriers. These barriers reduce or eliminate movement of adult and juvenile salmon within a watershed ultimately reducing potential spawning and rearing habitat.	Correction or removal fish passage barriers

The Salmon Subbasin Assessment and Management Plan (NPCC 2004) also considered high temperatures and chemical contamination to be limiting habitat quality in the South Fork drainage. Data presented by the USFS (2006) show that temperature values often exceed current temperature criteria, but these values are considered to reflect a natural temperature regime in most of the South Fork Salmon River drainage. Review of the available stream temperature data suggests that Idaho water quality standards for stream temperature are largely being met (IDEQ 2002). Currently, only Johnson Creek remains on the 303(d) list for violation of Federal bull trout temperature criteria.

As indicated by IDEQ (2002), dissolved metals from past mining activity, while still present, have mainly been found at levels below state and federal acute criteria standards. IDEQ (2002) indicated that total dissolved metals were below USEPA and state criterion and are declining with each year of sampling. Recent reclamation and CERCLA efforts have addressed potential impacts from mine sites to fish and fish habitat (USFS 2006), including removing hazardous materials toxic to aquatic organisms (USFS 2006).

1. Excess Sediment.

Fine sediment can harm steelhead and their habitat by smothering developing young steelhead in spawning gravels, filling in pools used by juveniles for cover, or reducing the availability of aquatic insects (food). Excess fine sediments can affect VSP parameters by reducing spawning and incubation success and by reducing juvenile rearing habitat quality. High sediment levels in the past likely reduced this population's abundance and productivity, but sediment levels are now improving.

Sediment has been the primary habitat concern in the South Fork Salmon watershed, although data indicate that current conditions are acceptable for spawning and that fine sediments, in general, are decreasing or at least stable (NPCC 2004). Fine sediments are naturally high in this watershed but were exacerbated by decades of intensive logging, grazing, mining, and road-building. IDEQ's (2002) review of biological data and sediment impacts to aquatic habitat indicates that habitat conditions within the South Fork Salmon subbasin are approaching the historic range of instream sediment levels. The TMDL approved by the USEPA in 1991 included targets for percent depth fines and cobble embeddedness. The data on these targets suggest that the watershed has attained the cobble embeddedness target with an improving trend but has not attained the target for percent depth fines.

NPCC (2004) rated sediment as a moderate priority for the East Fork South Fork Salmon and Johnson Creek. Currently, about 14.5 miles of stream in the lower East Fork South Fork remains on the 303(d) list for sediment (Figure 5.3-5, Table 5.3-6). IDEQ (2002) has indicated that the existing road system contributes large quantities of sediment during storm events. The close proximity of roads to streams is most likely the major contributing factor. In the East Fork South Fork Salmon River drainage, disturbance area as indicated by Equivalent Clearcut Area (ECA) is low (4%) and road densities also appear to be fairly low at 0.7 mi/sq. mile. ECA accounts for all human ground disturbances such as logging, mining, and roads, as well as natural disturbances such as wildfire. However, the concentration of roads near riparian conservation areas is relatively high at 2.2 mi/sq mi. As indicated by USFS (2006), the current use and maintenance of the mainstem East Fork South Fork Salmon River Road and the Quartz Creek Road, along with historical mining disturbance in the Stibnite area, are sources of existing and potential sediment delivery to the East Fork South Fork Salmon River.

Sediment TMDLs have been developed for about 77 miles of stream on the mainstem South Fork Salmon. In the Lower South Fork Salmon River sediment delivered to streams appears to be more dispersed. Total road density is low (0.4 mi/sq. mile), but the higher density of roads in riparian conservation areas (0.9 mi/sq mi) and in landslide prone areas may contribute to elevated sediment (USFS 2006). Data collected from 2001-2005 showed that substrate embeddedness was functioning at

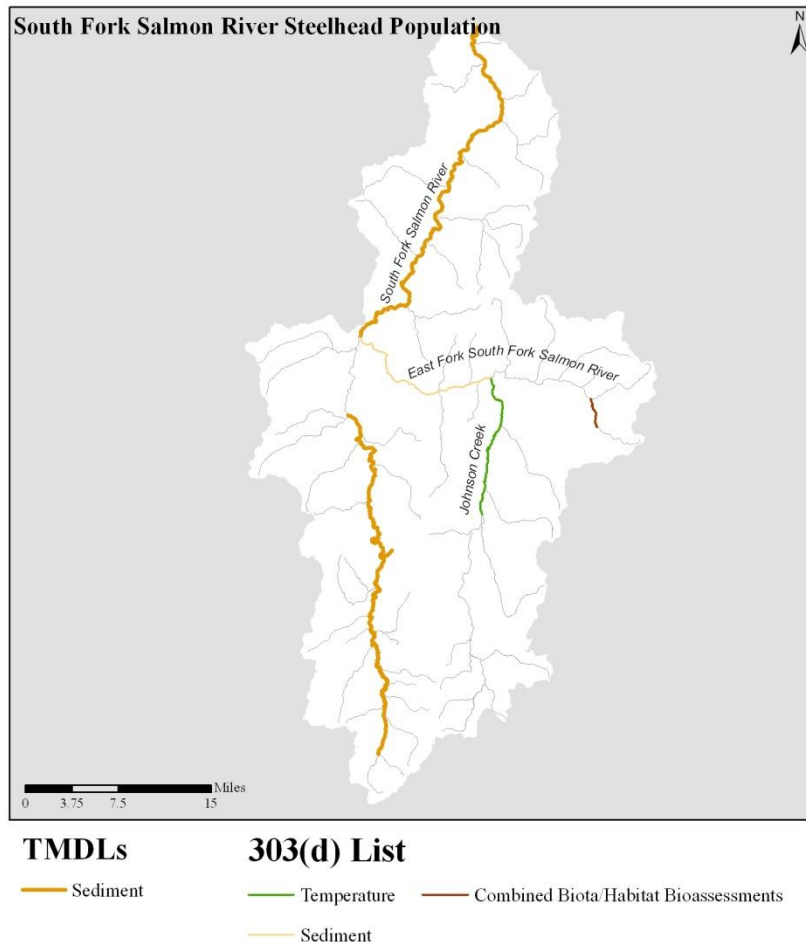


Figure 5.3-5. Stream segments in the South Fork Salmon River steelhead population identified from section 4a and 5 of the IDEQ 2008 303(d)/305(b) integrated report (IDEQ 2009).

risk for most of the analysis area, with the exception of Elk Creek, which was functioning at unacceptable risk.

In the Upper South Fork Salmon River total disturbance area was relatively low at 5 percent ECA in 2006 (USFS 2006) but has increased since then due to the Cascade Complex Wildfires of 2007. Total road densities are low at 0.5mi/sq mi although roads are concentrated in riparian areas (1.1mi/sq mi). The USFS (2006) reported relatively stable conditions for spawning gravels in this population but with some sampling sites functioning at risk or at unacceptable risk for intragravel conditions. Due to the natural erosive nature of the Idaho Batholith and the extensive ground disturbance caused by the Cascade Complex Wildfires, the risk of erosion and sediment delivery have been greatly increased for the next 10 to 30 years (USFS 2011).

High intrinsic habitat potential has been estimated for steelhead for most of the river reaches currently listed for sediment in the Upper South Fork Salmon and East Fork South Fork Salmon (see Figure 5.3-2 and Figure 5.3-5).

2. Reduced Habitat Complexity.

In the upper South Fork Salmon, habitat quality, as indicated by pool frequency and abundance of large woody debris, is functioning appropriately (USFS 2006). Poor habitat quality has been noted in Nasty Creek (low LWD) and Buckhorn Creek (low pool frequency). The quality of pool habitat was low in most streams. In the lower South Fork Salmon, habitat quality is generally good, except in Elk and Pony Creeks where there are fewer pools and LWD is less abundant than in the rest of the lower South Fork drainages (USFS 2006). In the East Fork South Fork Salmon River, the USFS (2006) noted poor habitat conditions: streams were deficient in LWD, had few pools, and poor pool quality. Poor habitat conditions were linked to disturbances caused by mining and roads within the riparian conservation areas.

3. Degraded Riparian Condition.

Degraded riparian conditions can threaten salmonids by impacting sediment, stream temperature, and habitat quality. Degraded riparian conditions may be reducing this population's abundance and productivity through changes in habitat quality.

Riparian conservation areas (RCAs) in the South Fork Salmon River have been affected by roads and mining. In the East Fork South Fork Salmon, riparian areas in the upper drainage are the most disturbed with only 62 percent of RCAs intact. RCAs in lower East Fork tributaries are in better condition at greater than 80 percent intact. In the lower South Fork Salmon River, riparian areas are functioning appropriately (USFS 2006). In the upper South Fork Salmon River, 33 percent of total road length is adjacent to streams, concentrating ground disturbances in the riparian conservation areas. Riparian areas in the upper South Fork Salmon are considered to be functioning at risk.

4. Migration Barriers.

Passage barriers in this population are primarily caused by road-stream crossings. In the Upper South Fork Salmon River, a culvert creates a passage barrier on Indian Creek. On Rice Creek, the USFS plans to restore fish passage at three road crossings that are currently barriers, creating access to two miles of potential steelhead habitat (USFS 2011). A perched culvert at the mouth of Goat Creek was replaced with an open-bottom structure in 2008, allowing steelhead to access habitat in this tributary. A possible barrier to fish passage on Grouse Creek, a tributary to the lower South Fork, may have been

created after a road along the stream recently washed out, depositing sediment and debris in the stream channel (USFS 2006). Fish passage may reestablish naturally over time as the stream cuts down through the debris. In the East Fork South Fork Salmon River drainage, barriers exist at culverts, some of which may only be barriers at low flows (USFS 2006). The East Fork Salmon River Road could present a man-made barrier in Reagan, Williams, and Dutch Oven Creeks. The “Glory Hole” on the mainstem East Fork South Fork is likely a barrier to steelhead at low flows. The Glory Hole is an old mining pit constructed mid-channel in 1955 in the upper East Fork South Fork above the Sugar Creek confluence. High stream gradients at the upstream end of excavation pit have created a possible upstream migration barrier to steelhead at certain flows.

Summary of Current Habitat Limiting Factors and Threats

In summary, habitat limiting factors in the South Fork Salmon River steelhead population are linked to human induced disturbances such as mining and road building. The inherently fragile parent geology combined with human disturbances and heavy precipitation makes the basin susceptible to large sediment producing events that degrade habitat quality for steelhead. Roads located near streams encroach on riparian habitat, limit potential sources of large woody debris, and create passage barriers at road-stream crossings. Priorities for addressing limiting factors in the South Fork Salmon steelhead population should be mitigation and elimination of sediment inputs from human caused disturbances, focused restoration efforts to improve habitat quality (LWD, pool frequency and quality), and elimination of fish passage barriers. Restoration of riparian areas, elimination of sediment inputs, and improvements habitat quality may require road obliteration, realignment, conversion or closure.

Potential Habitat Limiting Factors and Threats: Several potential concerns have not yet risen to the level of limiting factors, but needs to be managed to protect steelhead habitat in the South Fork Salmon River population area.

1. Degraded water quality from mineral exploration and development — Without sufficient water quality conservation measures, new mining operations could release sediment and toxic chemicals into surface waters.
2. Degraded habitat and water quality from wildfire — Severe wildfires can increase sediment delivery to streams and stream temperatures.
3. Degraded habitat from noxious weeds — The spread of noxious weeds can increase soil erosion and decrease native plant density.

Hatchery Programs

[To be developed]

Harvest Management

[To be developed]

Recovery Strategies and Actions

The recovery strategies that address a limiting factor may include both short-term and long-term actions. Short-term actions are projects scheduled to be implemented within the next ten years by a resource management agency or local stakeholder group. Long-term actions are categories of actions that could increase productivity for the population, but for which a specific project has not yet been proposed by a resource management agency or other stakeholder.

Natal Habitat Recovery Strategy and Actions

Priority stream reaches: The mainstem sections and tributaries of the East Fork South Fork, Johnson Creek, and the South Fork Salmon above the Secesh River are the priority stream reaches. These areas consist of the major and minor spawning areas within the population. The South Fork Salmon below the Secesh River is a lower priority. Emphasis for restoration projects in this lower section of the basin should be the adult and juvenile migration corridor of the South Fork Salmon River.

Habitat actions: The following habitat actions are intended to improve productivity rates and increase the effective capacity for natural smolt production in the population, and contribute to maintaining and restoring the VSP parameters while moving the population towards a viable status. These actions are ranked in priority order.

1. Further reduce sediment loading through road decommissioning and riparian enhancement projects in selected areas. Many miles of National Forest road have already been decommissioned in order to reduce sediment delivery to streams. Additional reductions in sediment delivery can also be realized by paving the approaches to bridges in areas likely to deliver sediment.
2. Restore riparian function in localized areas of the drainage by improving riparian vegetation and decreasing sediment delivery. Decommissioning or obliterating non-essential roads within riparian areas will allow regrowth of riparian vegetation. For permanent roads in riparian areas, appropriate maintenance practices will decrease sediment delivery to streams.
3. Eliminate fish passage barriers that are blocking steelhead from accessing potential habitat.

Implementation of Habitat Actions

Most of land in the South Fork Salmon River population area is federal, so responsibility for implementation of the habitat portion of the recovery plan for this population lies within the jurisdictions of the USFS. On federal lands, following the existing Land and Resource Management Plan should provide the protection needed for this population. The Boise National Forest will implement the Johnson Creek Watershed Improvement Project in 2011, which includes decommissioning roads along tributary streams and reducing dispersed recreation along Johnson Creek. The Nez Perce Tribe has also been active in implementing habitat improvement projects in the watershed, particularly road obliteration projects.

Many habitat restoration projects have already been completed in the South Fork Salmon River drainage. NPCC (2004) identified 83 projects directed at improving fish and wildlife habitat, of which 43 percent were related to roads and trails. IDEQ (2002) listed numerous projects (completed, pending, and ongoing) that were developed to reduce sediment input in the South Fork Salmon River drainage, including road closures and road improvements.

Table 5.3-8 identifies limiting factors, proposed actions, priority locations, short-term projects and associated costs for recovery of the South Fork Salmon River steelhead population.

Habitat Cost Estimate for Recovery

The estimated cost of recovery for short-term habitat projects is currently zero. Projects conducted as part of TMDL implementation or forest plan implementation will likely address the population's limiting factors, but these costs are not included in the recovery plan cost estimate. The Nez Perce Tribe has proposed a series of habitat projects to address limiting factors for both steelhead and Chinook throughout the South Fork Salmon River subbasin. These projects have not yet received funding, but have an estimated total annual cost of \$425,000. These costs are included in the spring/summer Chinook recovery costs and should not be double counted here.

Hatchery Recovery Strategy and Actions

[to be added]

Harvest Recovery Strategy and Actions

[to be added]

Table 5.3-8. Recovery Actions Identified for the South Fork Salmon River Steelhead Population.

Recovery Actions Identified for the South Fork Salmon River Steelhead Population.						
Natal Habitat Recovery Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020
South Fork Salmon River population	Degraded riparian function, including high levels of sediment delivery to streams	Road decommissioning, road upgrades, improved road maintenance practices, riparian restoration, and mine site rehabilitation		Total annual budget for the expanded South Fork Salmon River Project is \$425,000.00. This includes costs for projects in all of the populations in the South Fork Salmon River spring/summer Chinook MPG.		
	Migration barriers	Assess stream crossings and anthropogenic migration barriers, and eliminate fish passage barriers that are blocking steelhead from accessing potential habitat.	<p>The proposed South Fork Salmon River project covers the entire South Fork Salmon River subbasin. It would include approximately 15 miles of road decommissioning/improvement, one fish passage improvement (e.g. culvert removal/replacement), and 20 acres of weed management activities, soil restoration, and/or riparian restoration per year.</p> <p>30 miles of road decommissioning, reduction of dispersed recreation in riparian areas (part of "Johnson Creek Watershed Improvement Project")</p>	<p>The Nez Perce Tribe has proposed additional habitat projects to address limiting factors for Chinook and steelhead throughout the South Fork Salmon River subbasin. These projects have not yet received funding but have an estimated total annual cost of \$425,000. These costs are included in the spring/summer Chinook recovery costs.</p> <p>TMDL and Forest Plan Implementation will also occur and will likely deal with this population's limiting factors, but the costs are not included in this estimate.</p>	Similar projects to those completed between 2010 to 2020 will continue to be implemented if necessary.	No additional budget proposed at this time.

Hatchery Recovery Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020
Harvest Recovery Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020
Predation/Competition Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020

5.3.6.2 Chamberlain Creek Steelhead Population

Abstract/Overview

The Chamberlain Creek steelhead population is currently rated as maintained, with a moderate abundance/productivity risk. This rating reflects information for a surrogate population, which the ICTRT used because population-specific abundance estimates are currently unavailable. The Chamberlain Creek population is targeted to achieve a desired status of Viable, which requires a minimum of low abundance/productivity risk. The overall spatial structure and diversity rating is sufficiently low for the population to reach its desired status.

Current Status	Desired Status
Maintained	Viable

The actions identified in this recovery plan to occur over the next 10 years will likely not attain the desired status, so additional actions will be needed. Opportunities for improving survival beyond the short-term actions identified in this recovery plan may occur in all habitat types including spawning and rearing habitat, migration habitat and in the estuary. Some of these additional recovery actions may be identified and implemented in the near term; however, the major opportunity for identifying additional actions to increase survival will occur after the analysis of the information being collected during the ten-year term of the 2008 FCRPS Opinion, the U.S. v. Oregon agreement, and the Pacific Salmon Treaty. The monitoring and research information collected during this ten-year period, particularly in the mainstem rivers, will provide an important opportunity to complete a more detailed evaluation of the status of the species and will provide additional knowledge to guide the next round of actions under this recovery plan.

Currently, there is a high degree of uncertainty in estimating the nature and timing of a population's response to various recovery strategies, determining the gap between the current status and the desired status, and determining the amount of improvement necessary to achieve the viability target for this population. Due to this uncertainty, it is important to implement an adaptive management strategy, in conjunction with the ESA's five-year status reviews and the actions described in the Research, Monitoring, and Evaluation chapter. If the initial actions do not produce the intended response, the actions will be adjusted to produce the additional needed improvement.

Introduction

This section of the recovery plan compares the population's desired status to its current status, and describes how the population fits into the recovery strategy for the MPG and DPS. The primary sources of information are the ICTRT viability criteria (NMFS 2007b) and the ICTRT's Snake River steelhead status assessment (ICTRT 2008).

Population Status

The Population Status section describes the population's current status as defined in the ICTRT's most current status assessment (ICTRT 2008) where they discussed risk in terms of four viability parameters: Abundance, Productivity, Spatial Structure and Diversity. Other available information was also considered. The section focuses primarily on population Abundance (the total number of adults) and Productivity (the ratio of returning adults to the parental spawning adults). It compares the population's current status to the desired status in terms of both abundance and productivity. It also summarizes Spatial Structure (the amount and nature of available habitat) and Diversity (genetic traits)

concerns identified by the ICTRT. Diversity concerns are also discussed in the hatchery section. More details are available in the Snake River steelhead status assessment (ICTRT 2008).

Population Description: This population, which includes fish spawning in French, Sheep, Crooked, Bargamin, and Sabe Creeks, the Wind River, and Chamberlain Creek, was delineated based on life history and basin topography (ICTRT 2003). All streams in this population are classified as A-run (Kiefer et al. 1992), whereas the populations located in the South Fork Salmon River and lower Middle Fork Salmon River are classified as B-run. The Chamberlain Creek steelhead population (Figure 5.3-6) is one of twelve populations in the Salmon River MPG within the Snake River steelhead DPS.

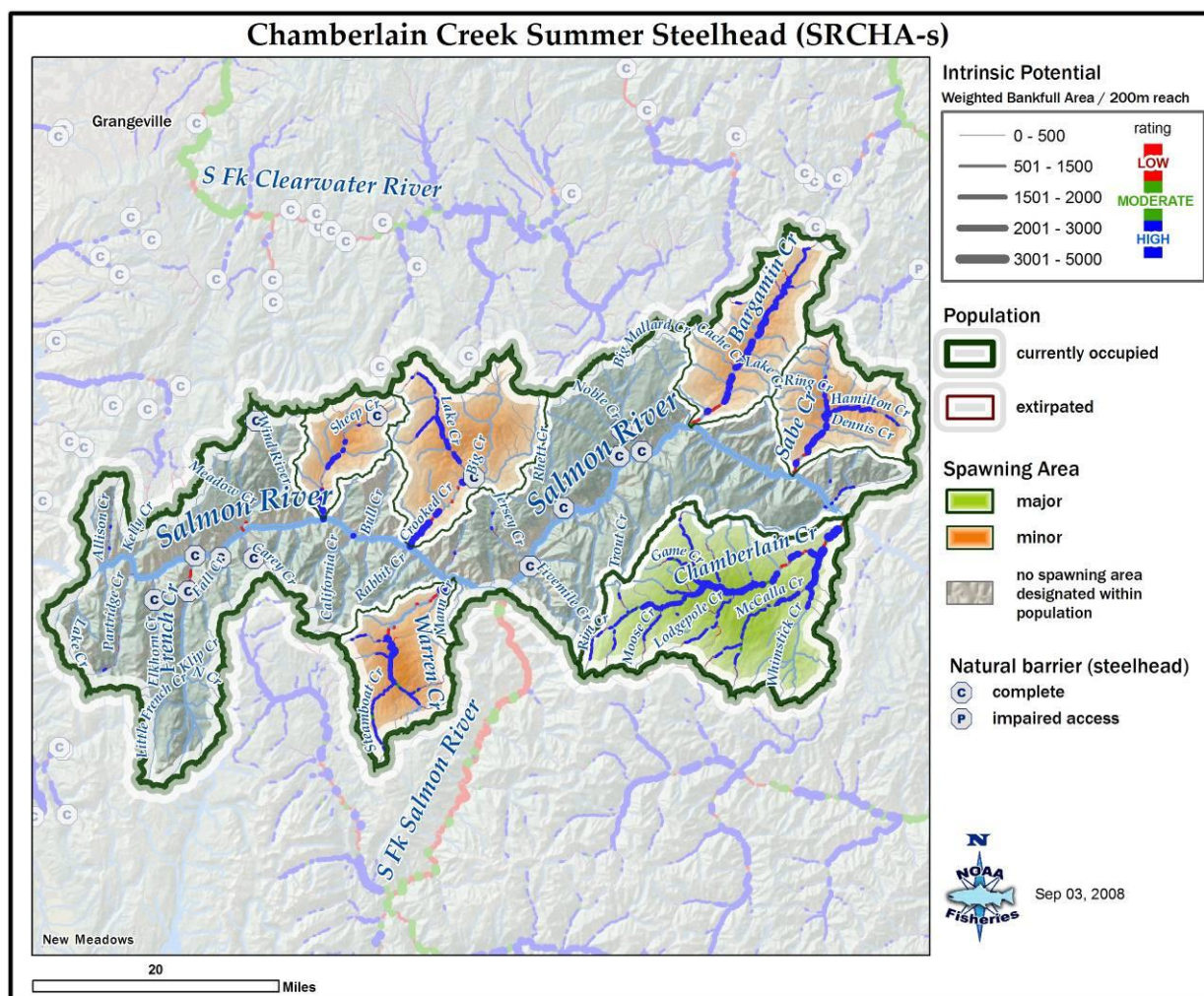


Figure 5.3-6. Chamberlain Creek steelhead population, with major and minor spawning areas.

The ICTRT classified the Chamberlain Creek population as “basic” in size and complexity based on historical habitat potential (ICTRT 2007). A “basic” steelhead population has a mean minimum abundance threshold of 500 natural-origin spawners with sufficient intrinsic productivity to achieve a 5 percent or less risk (“low risk”) of extinction over a 100-year timeframe.

Abundance and Productivity: Since population-specific abundance estimates are not available for most Snake River steelhead populations, including the Chamberlain Creek population, the ICTRT generated

preliminary estimates of average population abundance and productivity using annual counts of wild steelhead passing Lower Granite Dam. Estimates were developed for two average surrogate populations to represent both major run types (A and B). These abundance and productivity estimates were compared to a viability curve for an intermediate-sized Snake River steelhead population (requiring a minimum abundance threshold of 1,000 natural-origin spawners and a productivity of 1.14 recruits per spawner).

Preliminary estimates for the Chamberlain Creek steelhead population are based on information for the surrogate population for A-run steelhead. The surrogate population for A-run steelhead above Lower Granite Dam has an estimated recent abundance of 556 and productivity of 1.86. It is rated at Moderate risk based on current abundance and productivity, as shown in Figure 5.3-7, with a 25 percent or less risk of extinction over a 100-year period. Although the current estimate of intrinsic productivity is above the minimum threshold for low risk, the current average natural abundance (recent 10-year geometric mean) is well below the ICTRT minimum threshold value of 1,000. More specific information about how the abundance and productivity estimates were calculated is included in the ICTRT's steelhead status assessment Appendix B-1 *Calculating Representative Abundance and Productivity Estimates for Snake River A and B run Steelhead Populations*.

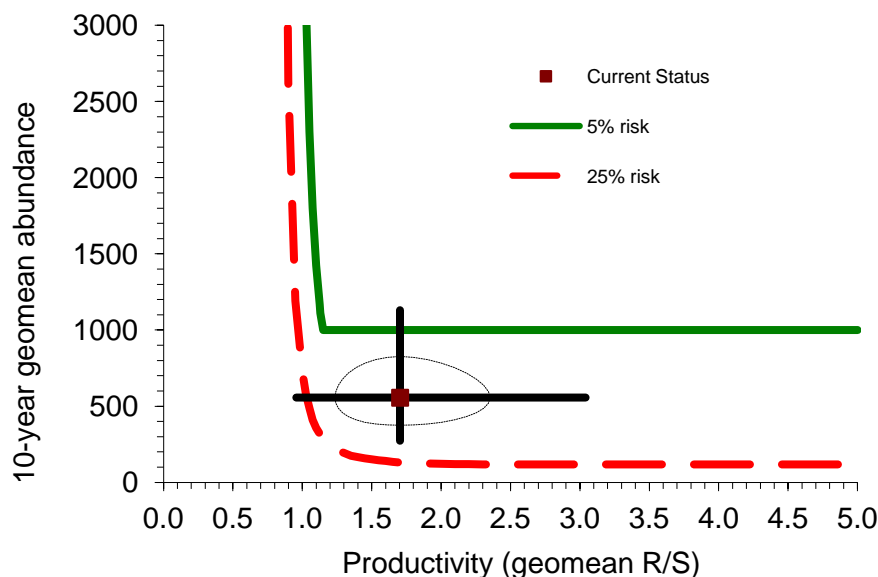


Figure 5.3-7. Snake River A-run surrogate steelhead population current estimated abundance and productivity (A/P) compared to DPS viability curve (1986-2005). Ellipse = 1 SE about the point estimate. Error bars = 90% CI for A, 98% CI for P (if point estimate >1% risk curve, the uncertainty test is <1% probability the combined A/P is at high risk).

While direct population-specific estimates of current abundance are not available, the IDFG has counted steelhead redds in Chamberlain and West Fork Chamberlain Creeks. From 1990 to 1998, total redds counted each year in the two transects surveyed ranged from 0 to 11 (Table 5.3-9). These transects did not cover all spawning habitat in Chamberlain Creek.

Based on the surrogate A-run population, the ICTRT gave this population a tentative abundance/productivity rating of moderate risk. However, the extremely low redd counts in surveyed

reaches of the population's one major spawning area suggest that the surrogate A-run population estimate of 556 may over predict abundance for this population.

Table 5.3-9. Steelhead redds counted in Chamberlain Creek drainage transects, 1990-1998. Data were obtained from the IDFG.

Transect Area	Year								
	1990	1991	1992	1993	1994	1995	1996	1997	1998
Chamberlain Creek	6	1	1	1	0	1	0	0	1
West Fork Chamberlain Cr	5	0	3	5	0	0	0	0	0
Total	11	1	4	6	0	1	0	0	1

Spatial Structure: The Chamberlain Creek population has one major spawning area and five minor spawning areas. All historic major and minor spawning areas are assumed to be currently occupied based on juvenile and adult surveys. The population's spatial structure score is therefore low risk. A low spatial structure risk is adequate for the population to attain its overall desired status.

Diversity: Since only A-run fish are believed to have historically occupied the Chamberlain Creek population, no major life history strategies have been lost. There is no hatchery program in this population. Cumulative diversity risk of low is adequate for the population to attain its desired status.

Summary: The Chamberlain Creek steelhead population is estimated to be at moderate risk due to a tentative moderate risk rating for abundance and productivity, based on the surrogate A-run population. In the absence of population-specific data, we assume that improvements in abundance and productivity will need to occur for this population to reach its desired status of viable. The overall spatial structure and diversity rating is sufficiently low for this population to reach its desired status. Table 5.3-10 shows the population's current and desired status in terms of cumulative abundance/productivity and spatial structure/diversity risks. A complete version of the ICTRT's draft status assessment for Snake River Basin steelhead populations is available upon request from NMFS.

Table 5.3-10. Chamberlain Creek population risk ratings integrated across the four viable salmonid population (VSP) metrics. The population does not meet population-level viability criteria.

		Spatial Structure/Diversity Risk			
		Very Low	Low	Moderate	High
Abundance/ Productivity Risk	Very Low (<1%)	HV	HV	V	M
	Low (1-5%)	V	V	V	M
	Moderate (6 – 25%)	M	M Chamberlain Creek	M	HR
	High (>25%)	HR	HR	HR	HR

Viability Key: HV – Highly Viable, V – Viable, M – Maintained, and HR – High Risk; shaded cells – do not meet viability criteria, with darkest cells signifying the highest risk of extinction. Percentages refer to risk of extinction over 100 years. Arrow points to desired risk status.

Limiting Factors and Threats Specific to Population

This section describes the limiting factors and threats that are specific for the population. The population is also affected by limiting factors and threats in the mainstem Columbia/Snake River corridor, estuary, and plume, and by climate change. Section 5.1.1 summarizes regional-level factors that affect all Idaho Snake River steelhead populations.

Natal Habitat

Habitat Conditions: The Chamberlain Creek steelhead population includes the Salmon River and its tributaries from the mouth of the Little Salmon River upstream to Chamberlain Creek, excluding the South Fork Salmon River drainage. The drainage area within this steelhead population is about 4,073 km² (1,573 mi²). There are about 1,899 km of stream within the Chamberlain Creek population with less than half (804 km) occurring downstream from natural barriers. Watersheds draining the south-side of the Salmon River include Lake, Partridge, Elkhorn, French, Fall, California, Warren, and Chamberlain Creeks. Watersheds draining the north-side of the Salmon River include Allison, Wind, Sheep, Mallard, Bargamin, and Sabe Creeks. Streams in this geographic area tend to be V-shaped valleys draining mountainous, high gradient, topography. Typical of mountainous areas, snowmelt creates high flows in spring with low flows generally occurring in late summer/fall and into the winter. Steelhead are presumed to be distributed throughout many of the streams within the population, all abundance and density are less well known. The ICTRT identified one major (Chamberlain Creek) and

five minor (Bargamin, Crooked, Warren, Sabe, and Sheep Creeks) spawning areas. The quality of steelhead spawning and rearing habitat in this population was rated as mostly excellent (NPCC 2004, p 1-36).

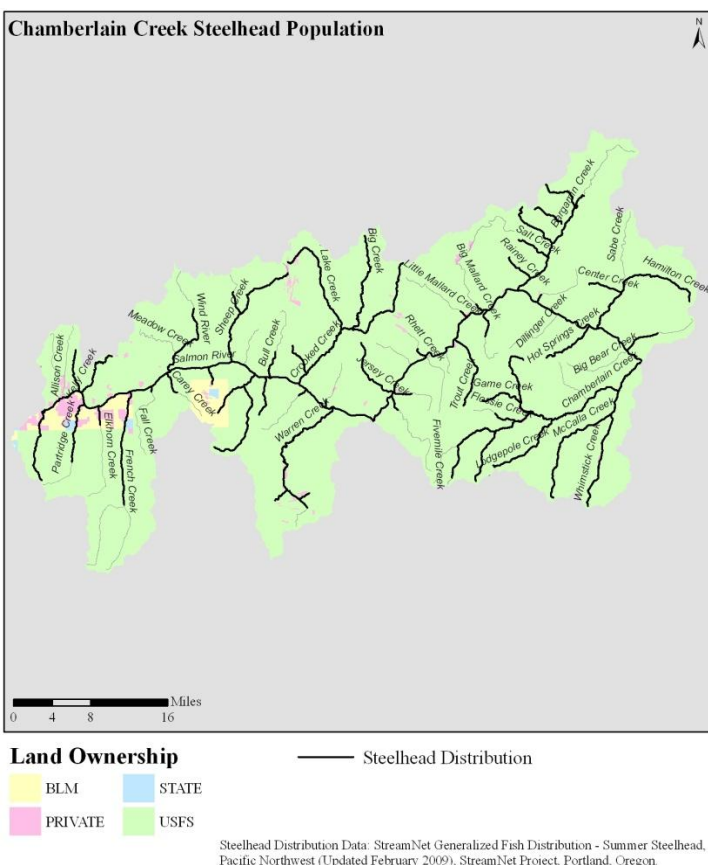


Figure 5.3-8. Land ownership pattern within the Chamberlain Creek steelhead population.

Land ownership within Chamberlain Creek steelhead population is primarily USFS (96.0%) with BLM (2.2%), state (0.2%), and private (1.6%) combined at less than five percent (Figure 5.3-8). The BLM administers lands near Carey Creek and downstream near Partridge Creek. Private lands are mostly scattered along the north side of Salmon River and downstream near Partridge, Elkhorn, and French Creeks. State owned land is concentrated on the south side of the Salmon River close to private and BLM lands.

Land use in the Chamberlain Creek steelhead population has included mining, logging, grazing, recreation, and road construction associated with such activities. Development is limited with no incorporated cities, just small communities such as Dixie and Warren.

This portion of the Salmon River drainage has not been significantly impacted by habitat fragmentation associated with land uses and development (NPCC 2004). In large part, the quality of habitat for most of the population is a result of many of the streams draining the Gospel-Hump and Frank Church River of No Return wildernesses. In the Chamberlain Creek drainage there has been no recent resource development. Two large stock ranches in the basin were active in the early 1900s, but most recent activity has been associated with recreational use and incidental grazing by pack animals. Localized disturbances throughout this steelhead population have occurred, many of which are legacy issues related to past land uses. Because much of the subbasin is designated wilderness, there has been very little recent timber harvest. Historically, grazing occurred in several drainages such as Bargamin, Big, Sabe, and Sheep Creeks, but recent grazing management has allowed a general upward trend in vegetation condition. Most limiting factors identified for this steelhead population are related to mining and roads. As noted by UFSF (1999, 2007) and IDEQ (2002), Allison, Warren, and Crooked Creeks are the areas of concern. Warren Creek was extensively dredge mined in the past, affecting habitat quality and riparian vegetation. Similarly, Crooked Creek in the vicinity of Dixie was dredged in the past and insufficient riparian shade contributes to elevated stream temperatures. In Allison Creek, the main concern is roads that produce sediment.

The IDEQ's 2008 Integrated (303(d)/305(b)) Report includes stream segments in this population that are not fully supporting their assessed beneficial uses. Table 5.3-11 shows the impaired stream segments listed in IDEQ's 2008 Integrated Report under section 5 (impaired waters that need a TMDL), section 4c (waters impaired by non-pollutants), and section 4a (impaired waters than have an EPA-approved TMDL) (IDEQ 2009).

Table 5.3-11. Stream segments in the Chamberlain Creek steelhead population identified from Sections 4a, 4c, and 5 of the IDEQ 2008 303(d)/305(b) integrated report (IDEQ 2009).

Waterbody	Impairment/Cause	Stream Miles
Section 5-303(d)		
Allison Creek - West Fork Allison Creek to mouth	Sedimentation/Siltation	2.72
Section 4c-Waters Impaired by Non-pollutants		
Warren Creek - tributaries	Physical substrate habitat alterations	77.02
Warren Creek - source to mouth	Physical substrate habitat alterations	9.28
Warren Creek - source to roadless boundary	Physical substrate habitat alterations	8.7
Section 4a-TMDLs		
Crooked Creek - Lake Creek to mouth	Water temperature	8.27
Crooked Creek - source to unnamed tributary	Water temperature	41.74
Crooked Creek - unnamed tributary to Big Creek	Water temperature	2.5

Current Habitat Limiting Factors: NMFS determined the habitat limiting factors by reviewing multiple data sources and reports on stream conditions. Based on reports and discussions with local fisheries experts and watershed groups, we conclude that the habitat limiting factors for the Chamberlain Creek steelhead population are migration barriers, sediment, habitat quality and temperature. Table 5.3-12

summarizes the mechanisms by which each limiting factor affects steelhead, and the management objectives for addressing each limiting factor. This section discusses each limiting factors, using information from USFS reports, IDEQ reports, and the Salmon Subbasin Assessment and Management Plan (USFS 2006; IDEQ 2002, 2009; NPCC 2004; Ecovista 2004).

Table 5.3-12. Primary limiting factors identified for the Chamberlain Creek steelhead population, mechanisms by which each limiting factor affects salmonids, and management objectives for addressing each limiting factor.

Limiting Factors	Effects on Salmonids	Management Objectives to Address Limiting Factors
Migration Barriers	Migration barriers such as dams, culverts, and dewatered stream sections can create fish passage barriers. These barriers reduce or eliminate movement of adult and juvenile salmon within a watershed ultimately reducing potential spawning and rearing habitat.	Correct or remove fish passage barriers
Sediment	Excess sediments can reduce juvenile habitat (rearing), aquatic insect availability (food), and spawning and incubation success (reproduction).	Riparian restoration actions to stabilize streambanks and reduce sedimentation to the stream
Habitat Quality	Reduced habitat quality as measured by pools frequency, pool quality, and sufficient LWD reduces juvenile rearing and adult holding.	Restoration of instream and riparian habitats
Temperature	High stream temperatures affect salmonid growth and development, alter life history patterns, induce disease, or exacerbate competitive predator-prey interactions. High stream temperature can also be lethal to both adult and juvenile salmonids.	Passive restoration of riparian vegetation to improve shade and stream cover. Improved bank stability may lead to reduced stream width-to-depth ratios, which may also improve stream temperatures.

1. *Migration Barriers.*

The extent of migration barriers in the Chamberlain Creek steelhead population is unknown but may be affecting population abundance and productivity by limiting available spawning and rearing areas.

Migration barriers are a potential limiting factor because the location and status of the physical structures in this population have not been established. In the subwatershed summaries produced by the Nez Perce National Forest, there were several undetermined fish migration barriers occurring in the subwatersheds of Rhett, Middle-Salmon Jersey, and possibly Lake. It is unknown whether these potential migration barriers affect steelhead spawning and rearing habitat. The USFS (2007) also indicated that there are at least four culverts in the Warren Creek analysis area that are potential fish passage barriers and that in some tributaries, such as Smith Creek, dredge piles in the stream channel may hinder or block fish passage. The USFS (1999) also identified culverts associated with Road 1614 that need to be evaluated and possibly removed.

2. *Excess Sediment.*

Despite the remote location of this population, high sediment levels from past land uses may be reducing this population's abundance and productivity. Sediment was listed by IDEQ (2002, 2009) as impairing beneficial uses on 2.7 miles of Allison Creek. The USFS (1999, 2007) also documented elevated sediment conditions for some streams above desired conditions. Conditions in Elkhorn Creek were considered functioning at risk with cobble embeddedness at 26 percent, although a significant long-term downward trend was indicated. French Creek and Little French Creek also have higher than desired cobble embeddedness (>30%) but a trend was not indicated. Off-road vehicle use and livestock

within the French Creek watershed have created local concerns for streams and riparian areas (USFS 2007).

Substrate conditions in Fall Creek were considered functioning at unacceptable risk with a mean cobble embeddedness of 33.5 percent. The Fall Creek drainage has a very high total road density (2.30 mi/mi²) and a total of 4.97 miles within riparian conservation areas. Motorized vehicle damage in Fall Creek was noted in headwater areas, tributary and trail crossings, and in seep areas along the trail south of the wetlands (USFS 2007). In Warren Creek, cobble embeddedness has not been measured directly; however, the high surface fines estimates (Raleigh 1995) indicate that embeddedness may be high as well. The USFS (1999) noted for steelhead that in tributaries such as Allison and Crooked Creeks, the effects of sediment have probably lowered the carrying capacity of juvenile rearing and quality of spawning habitat from roads and mining development. Figure 5.3-9 shows stream segments in the Chamberlain Creek area that are listed under the Clean Water Act (IDEQ 2009).

3. Degraded Habitat Complexity and Quality.

Indicators of habitat quality in the Chamberlain Creek steelhead population are generally in good condition except as noted below. In the Warren Creek analysis area, the USFS (2007) noted a low frequency of LWD in Warren Creek. Pool frequency met current standards but there were few quality pools available. USFS (2007) suggested that past activities, such as dredge mining, road construction within riparian areas, and logging had likely led to reduced quantities of LWD. They noted that future potential for LWD recruitment is limited in areas where stream channels flow through dredge piles, or along roads. Streambanks in the analysis area are generally stable, but development and dredge mining on Warren Creek has altered riparian ecosystems extensively in certain areas leading to loss of shade, LWD recruitment, and sediment buffering capabilities. IDEQ (2002) listed about 95 stream miles in the Warren Creek drainage as impaired by habitat alterations. Pool frequency and pool quality were considered low in Allison Creek, possibly due to chronic sediment delivery from existing roads may have filled in pools (USFS 1999).

4. Elevated Water Temperatures.

NPCC (2004, p.3-28) rated stream temperature as having a moderate-to-high level of influence on habitat quality for the Chamberlain Creek steelhead population. IDEQ listed stream temperature as impairing water quality on about 52 miles of Crooked Creek and developed a temperature TMDL for

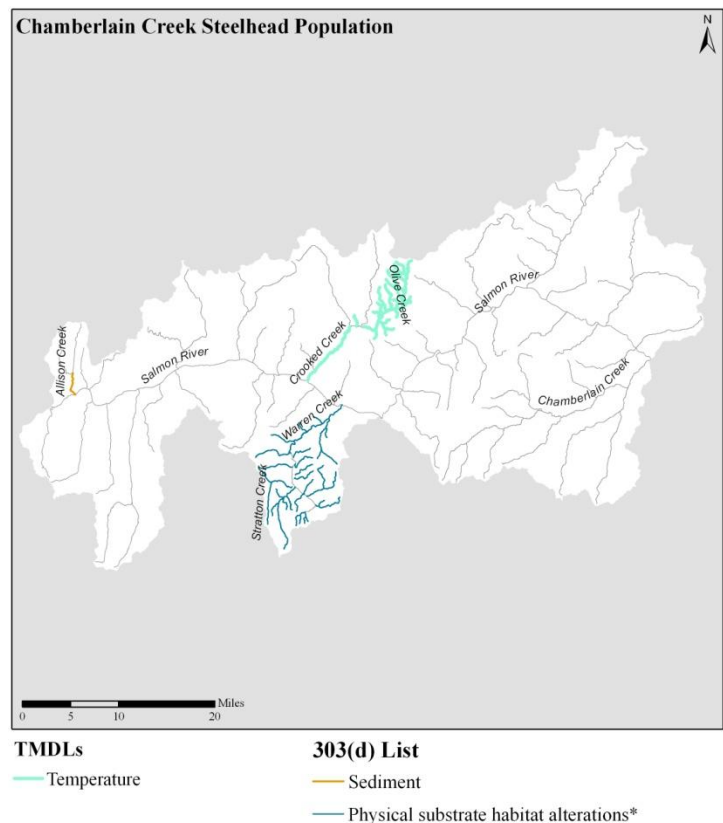


Figure 5.3-9. Stream segments in the Chamberlain Creek steelhead population listed under Sections 4a, 4c, and 5 of the Clean Water Act in the IDEQ 2008 303(d)/305(b) integrated report (IDEQ 2009).

this drainage in 2002 (Table 5.3-10; Figure 5.3-9). Temperature data indicated that salmonid spawning criteria were exceeded for the six years of data evaluated in Crooked Creek (IDEQ 2002).

The legacy affects of past mining, roads, development, and timber harvest have altered riparian condition, reducing canopy cover. Increased width-to-depth ratios for Crooked Creek are likely the result of dredge mining within the stream. Canopy cover and bankfull width data presented by IDEQ (2002) suggest that the area in need of the most improvement is the area from the bottom of Dixie Meadow (RM 11) to about Nugget Gulch (RM 17). The TMDL calls for regrowth of riparian vegetation to provide natural levels of shade. Because the Crooked Creek watershed is under predominantly federal ownership, with over half of the drainage in the Gospel-Hump Wilderness, shade levels are likely to recover naturally over time.

In other tributaries in this population, the USFS (2007) has recorded temperatures above the NMFS (1996) standards for properly functioning habitat conditions for Chinook salmon and steelhead. Streams such as Lake, Elkhorn, French, Fall, and Warren Creeks have displayed streams temperatures above desired temperature range of 10-13.9 °C. However, the temperatures in most of these streams appear to be similar to undisturbed control sites, suggesting that the high temperatures are part of the natural range of variability. In Warren Creek, on the other hand, past activities such as dredge mining and road construction in riparian areas have likely led to an increase in stream temperatures by reducing shade and increasing the streams width-to-depth ratio (USFS 2007). With the exception of Warren Creek, active restoration of riparian vegetation in the Chamberlain Creek population is not a high priority action for steelhead under this recovery plan.

Summary of Current Habitat Limiting Factors and Threats

In summary, most of the habitat in this population is in relatively good shape. Habitat limiting factors in the Chamberlain Creek steelhead population are linked to human induced disturbances such as mining, roads, timber harvest, and recreation. These disturbances are concentrated in a few watersheds. NMFS has identified migration barriers, sediment, temperature, and habitat quality as limiting factors. Extensive dredge mining and road construction in specific watersheds have degraded aquatic and riparian habitat conditions. The USFS (2007) has also indicated that some livestock, timber harvest, and motorized recreational use have contributed to local disturbances at stream crossings, meadows, and within riparian habitats.

Potential Habitat Limiting Factors and Threats: Several potential concerns have not yet risen to the level of limiting factors, but needs to be managed to protect steelhead habitat in the Chamberlain Creek population area.

1. Degraded habitat from noxious weeds — The spread of noxious weeds can increase soil erosion and decrease native plant density.
2. Degraded riparian condition and water quality due to recreational use — Impacts from recreational use can impact riparian vegetation, increase sediment delivery, and spread noxious weeds.

Hatchery Programs

[To be developed]

Harvest Management

[To be developed]

Recovery Strategies and Actions

The recovery strategies that address a limiting factor may include both short-term and long-term actions. Short-term actions are projects scheduled to be implemented within the next ten years by a resource management agency or local stakeholder group. Long-term actions are categories of actions that could increase productivity for the population, but for which a specific project has not yet been proposed by a resource management agency or other stakeholder.

Natal Habitat Recovery Strategy and Actions

Priority stream reaches: The primary strategy for this remote population is continued protection of relatively unimpaired habitat, particularly in the Chamberlain, Bargamin, and Sabe Creek steelhead spawning areas (see Figure 5.3-6). Active watershed restoration in specific tributaries heavily impacted by past land uses may also benefit this steelhead population. Active restoration of the stream channel could improve steelhead habitat in both Crooked and Warren Creeks by enhancing shade and bank stability. Throughout the population, additional benefits will accrue by mitigating chronic sediment sources from roads, trails, stream crossings, and unauthorized vehicle use. Mitigation efforts to clean up, remove, and stabilize mine tailings and waste rock deposited in the stream channel and floodplains in Warren, Falls, Lake, and upper Crooked Creeks could benefit this steelhead population (Ecovista 2004). Warren and upper Crooked Creeks were targets identified for rehabilitation by the USFS (1999). The Nez Perce National Forest has indicated that it plans to work with local landowners in Dixie and IDFG to develop a long-term aquatic restoration strategy for upper Crooked Creek (USFS 1999).

Habitat actions: The following habitat actions are intended to improve productivity rates and increase the effective capacity for natural smolt production in this population.

1. Identify and eliminate fish passage barriers that are blocking steelhead from accessing potential habitat.
2. In non-wilderness areas, reduce chronic sediment delivery to streams through obliteration, realignment, maintenance, or closure of roads, through restriction of unauthorized vehicle and ATV travel, and through restoration of mine sites.
3. Rehabilitate stream channels impacted by historic mining.

Implementation of Habitat Actions

Responsibility for implementation of habitat recovery actions for this population lies largely within the jurisdiction of the USFS. Following the existing USFS Land and Resource Management Plan should provide the protection needed for this population. IDFG has management responsibility for fish and wildlife in this area. No habitat projects are currently proposed for the Chamberlain Creek steelhead population.

Several habitat restoration projects have been completed within this population. The NPCC (2004 p. 4-9) identified only four restoration projects for the area that were aimed at fish passage, road or trail management, upland habitat protection, and channel restoration. However, IDEQ (2002) reported numerous efforts (road obliteration, planting, seeding, etc.) by the USFS that were completed (1992-1997) and designed at controlling sediments from roads, trails, and mines. The USFS (2007) has indicated several other completed projects within this population. Planned restoration activities in the Warren Creek drainage include several miles of trail relocation and road maintenance (Zuniga 2001). The USFS (1999) has indicated that it will work with local landowners in Dixie and the Idaho Department of Fish and Game to build a long-term aquatic restoration strategy for upper Crooked Creek.

Habitat Cost Estimate for Recovery

Since no habitat projects are currently proposed for the Chamberlain Creek steelhead population, there are no recovery plan short-term costs associated with this population.

Hatchery Recovery Strategy and Actions

[to be added]

Harvest Recovery Strategy and Actions

[to be added]

5.3.6.3 Lower Middle Fork Salmon River Steelhead Population

Abstract/Overview

The Lower Middle Fork Salmon River population is currently rated as not viable, with a high abundance/productivity risk. The surrogate B-run population used to estimate the current status of the Lower Middle Fork population is currently rated as high risk. The population is targeted to achieve a desired status of Highly Viable, which requires a minimum of very low abundance/productivity risk. The overall spatial structure and diversity rating is sufficiently low for the population to reach its desired status.

Current Status	Desired Status
High Risk	Highly Viable

The actions identified in this recovery plan to occur over the next 10 years will likely move this population to maintained status, but additional actions to improve survival will be needed for the population to achieve its desired status of highly viable. Some minor improvements may be made in the spawning and rearing habitat, but the majority of the improvements will need to be made in the migration corridor and estuary. The monitoring and research information collected over the next ten years will provide an important opportunity to complete a more detailed evaluation of the status of the species and will provide additional knowledge to guide the next round of actions under this recovery plan.

Currently, there is a high degree of uncertainty in estimating the nature and timing of a population's response to various recovery strategies, determining the gap between the current status and the desired status, and determining the amount of improvement necessary to achieve the viability target for this population. Due to this uncertainty, it is important to implement an adaptive management strategy, in conjunction with the ESA's five-year status reviews and the actions described in the Research, Monitoring, and Evaluation chapter. If the initial actions do not produce the intended response, the actions will be adjusted to produce the additional needed improvement.

Introduction

This section of the recovery plan compares the population's desired status to its current status, and describes how the population fits into the recovery strategy for the MPG and DPS. The primary sources of information are the ICTRT viability criteria (NMFS 2007b) and the ICTRT's Snake River steelhead status assessment (ICTRT 2008).

Population Status

The Population Status section describes the population's current status as defined in the ICTRT's most current status assessment (ICTRT 2008) where they discussed risk in terms of four viability parameters: Abundance, Productivity, Spatial Structure and Diversity. Other available information was also considered. The section focuses primarily on population Abundance (the total number of adults) and Productivity (the ratio of returning adults to the parental spawning adults). It compares the population's current status to the desired status in terms of both abundance and productivity. It also summarizes Spatial Structure (the amount and nature of available habitat) and Diversity (genetic traits) concerns identified by the ICTRT. Diversity concerns are also discussed in the hatchery section. More details are available in the Snake River steelhead status assessment (ICTRT 2008).

Population Description: The ICTRT (2003) identified the lower Middle Fork Salmon River and its tributaries, up to and including Loon Creek as an independent steelhead population (Figure 5.3-10). Besides Loon Creek, the other major steelhead tributaries in this population are Camas Creek and Big Creek. A NMFS model of potential habitat for the Interior Columbia Basin, based on geomorphological characteristics, suggests that the historic distribution of steelhead could have included the mainstem Middle Fork, but current steelhead spawning in the mainstem of the Middle Fork Salmon River is uncertain. The Lower Middle Fork Salmon River population is a B-run population.

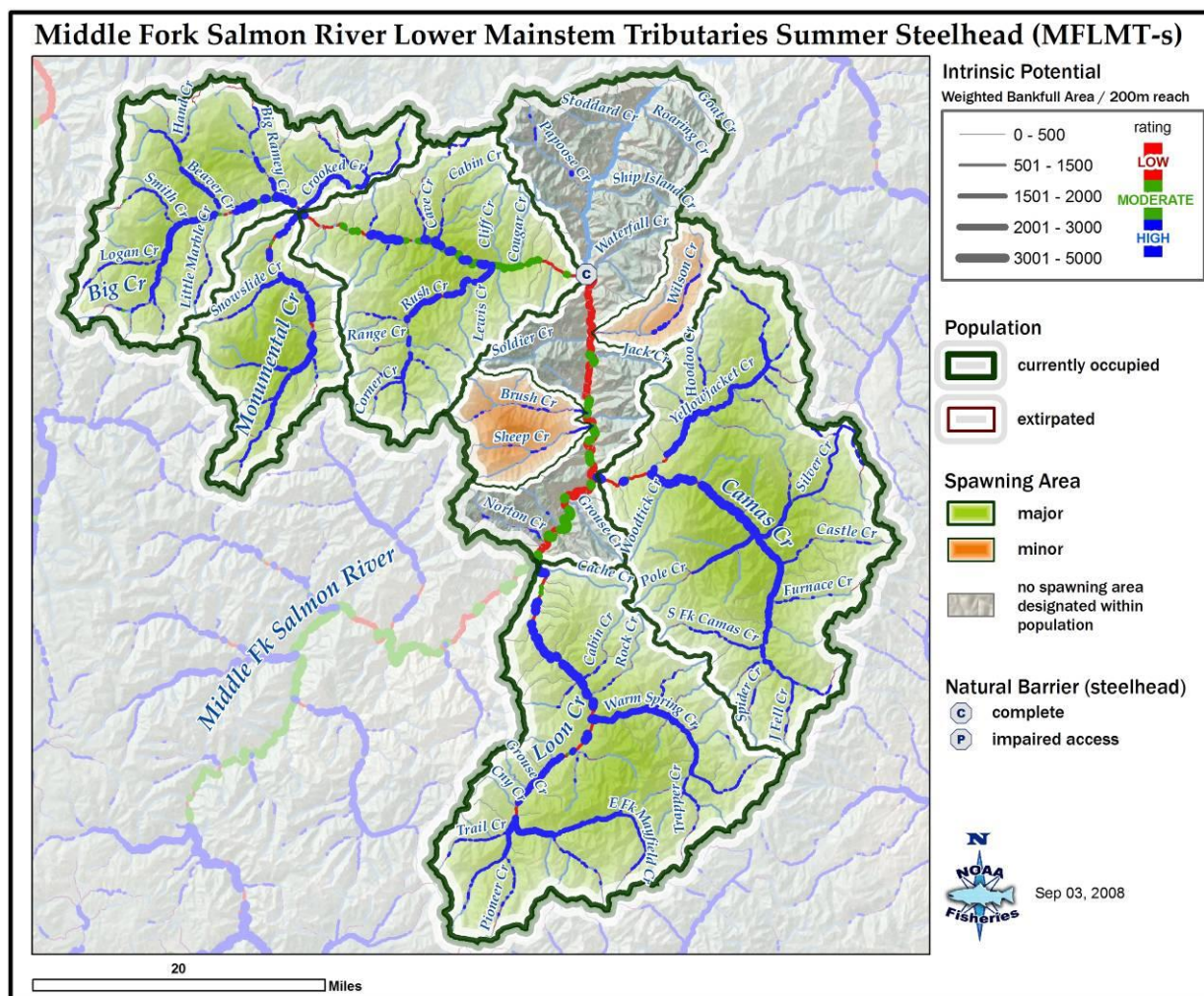


Figure 5.3-10. Lower Middle Fork Salmon River steelhead population, with major and minor spawning areas.

The ICTRT (2007) classified the Lower Middle Fork Salmon River population as “intermediate” in size and complexity based on historical habitat potential. A steelhead population classified as intermediate has a mean minimum abundance threshold of 1,000 natural-origin spawners with sufficient intrinsic productivity (≥ 1.14 recruits per spawner at the abundance threshold) to achieve a 5 percent or less risk (“low risk”) of extinction over a 100-year timeframe. For this population to

achieve a 1 percent or less risk (“very low risk”) of extinction over 100 years, productivity would need to be at or greater than 1.29 recruits per spawner (R/S) at the abundance threshold of 1,000 spawners.

Abundance and Productivity: Direct estimates of current abundance are not available for the Lower Middle Fork Salmon River population. There are no weirs where steelhead escapement for the entire population can be monitored. However, steelhead redds were counted by the IDFG in most years from 1987-1998 in several Middle Fork Salmon River tributary reaches (transects did not include all spawning habitat). Total redds counted each year in the surveyed transects ranged from 0 to 143 (Table 5.3-13).

Table 5.3-13. Lower Middle Fork Salmon River steelhead population redds counted in survey transects, 1987-1998. Data obtained from IDFG. (“nc” indicates no count.)

Transect Area	Year									
	1987	1990	1991	1992	1993	1994	1995	1996	1997	1998
Big Creek	nc	44	25	nc	nc	6	4	5	nc	6
Camas Creek	27	55	26	3	nc	12	10	6	nc	1
Loon Creek	nc	38	17	8	nc	3	4	5	nc	nc
South Fork Camas Creek	nc	nc	1	4	3	0	1	0	0	3
West Fork Camas Creek	nc	6	nc	nc	nc	nc	nc	nc	nc	nc
Grand Total	27	143	69	15	3	21	19	16	0	10

Since population-specific abundance estimates are not available for most Snake River steelhead populations, including the Lower Middle Fork Salmon River population, the ICTRT generated preliminary estimates of average population abundance and productivity using annual counts of wild steelhead passing Lower Granite Dam. Estimates were developed for two average surrogate populations to represent both major run types (A and B). These abundance and productivity estimates were then compared to a viability curve for an intermediate-sized Snake River steelhead population (requiring a minimum abundance threshold of 1,000 natural-origin spawners and a productivity of 1.14 recruits per spawner).

The ICTRT used information for the surrogate population for B-run steelhead above Lower Granite Dam to estimate abundance/productivity of the Lower Middle Fork Salmon River steelhead population. The surrogate population has an estimated recent abundance of 345 and productivity of 1.09. It is rated as high risk based on current abundance and productivity, as shown in Figure 5.3-11. The point estimate representing current status lies just below the 25 percent risk curve for intermediate-sized Snake River steelhead populations, indicating a greater than 25 percent risk of extinction over a 100-year timeframe. More specific information about how the abundance and productivity estimates were calculated is included in the ICTRT’s steelhead status assessment Appendix B-1 *Calculating Representative Abundance and Productivity Estimates for Snake River A and B run Steelhead Populations*.

Based on the surrogate B-run population, substantial increases in abundance and productivity will be necessary for the Lower Middle Fork Salmon River population to reach its desired status of highly viable.

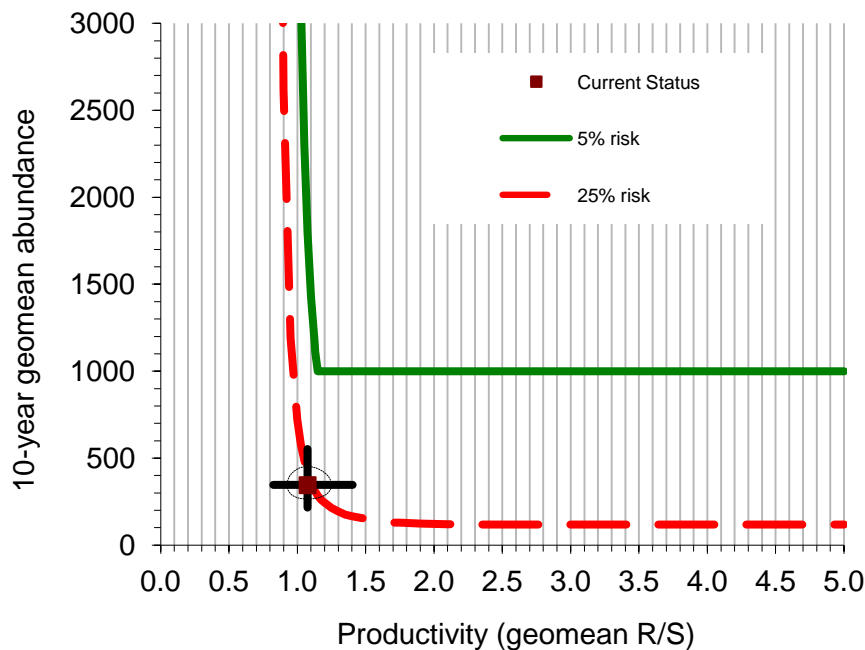


Figure 5.3-11. Snake River B-run surrogate steelhead population current estimated abundance and productivity (A/P) compared to DPS viability curve (1986-2005). Ellipse = 1 SE about the point estimate. Error bars = 90% CI for A, 98% CI for P (if point estimate >1% risk curve, the uncertainty test is <1% probability the combined A/P is at high risk).

Spatial Structure: The ICTRT has identified five major spawning areas (Camas Creek, Look Creek, Upper Big Creek, Lower Big Creek, and Monumental Creek—a Big Creek tributary) and two minor spawning areas (Brush Creek and Wilson Creek) within this population. All major and minor spawning areas are presumed to be occupied based on data collected during presence/absence and density monitoring for juvenile steelhead. The extensive branching of occupied spawning habitat leads to a very low spatial structure risk, which is adequate for the population to reach its desired status.

Diversity: The major life history strategies historically represented in the population are unknown, but the population is currently classified as consisting only of B-run steelhead. Genetic samples from this population were geographically cohesive and differentiated from other Salmon River steelhead populations, and there is no hatchery program in the Middle Fork Salmon River basin. Cumulative diversity risk is therefore low, which is adequate for the population to meet its desired status.

Summary: The Lower Middle Fork Salmon River steelhead population is currently at high risk due to a tentative high risk rating for abundance/productivity. A population-specific monitoring program will be necessary to reduce the uncertainty of this rating. In the absence of population-specific abundance data, we assume that substantial increases are needed in abundance and productivity for this population to reach its desired status of highly viable. Table 5.3-14 shows the population's current and desired status in terms of cumulative abundance/productivity and spatial structure/diversity risks. A complete version of the ICTRT's draft status assessment for Snake River Basin steelhead populations is available upon request from NMFS.

Table 5.3-14. Lower Middle Fork Salmon River steelhead population risk ratings integrated across the four viable salmonid population (VSP) metrics. The population does not meet population-level viability criteria.

		Spatial Structure/Diversity Risk			
		Very Low	Low	Moderate	High
Abundance/ Productivity Risk	Very Low (<1%)	HV	HV ↑	V	M
	Low (1-5%)	V	V	V	M
	Moderate (6 – 25%)	M	M	M	HR
	High (>25%)	HR	HR Lower Middle Fork Salmon River ↓	HR	HR

Viability Key: HV – Highly Viable, V – Viable, M – Maintained, and HR – High Risk; shaded cells – do not meet viability criteria, with darkest cells signifying the highest risk of extinction. Percentages refer to risk of extinction over 100 years. Arrow points to desired risk status.

Limiting Factors and Threats Specific to Population

This section describes the limiting factors and threats that are specific for the population. The population is also affected by limiting factors and threats in the mainstem Columbia/Snake River corridor, estuary, and plume, and by climate change. Section 5.1.1 summarizes regional-level factors that affect all Idaho Snake River steelhead populations.

Natal Habitat

Habitat Conditions: The Lower Middle Fork steelhead population includes the Middle Fork Salmon River watersheds downstream from Loon Creek. Major watersheds within the Lower Middle Fork include Loon Creek, Camas Creek, and Big Creek. The geographic area encompassed within this population has a drainage area of approximately 1,731 square miles (4,482 km²).

The Middle Fork Salmon River subbasin has a broad climate range with prevalent Pacific maritime regime in the western watershed to a more continental regime in the eastern area (IDEQ 2008). The region is generally characterized by warm summers and mild or cool winters. For the Middle Fork Salmon River subbasin, most precipitation occurs as snow during winter and early spring, while summers are generally dry. Western portions of the subbasin generally receive more precipitation. Stream flow peaks during the spring months from snow melt.

Aquatic habitats in the lower Middle Fork were rated as good to excellent (NPCC, p. 2-138). There are about 1,942 km of stream within the population with about 1,285 km downstream of natural barriers. Major spawning areas designated for this population include Loon Creek, Camas Creek, Upper and Lower Big Creek, and Monumental Creek. Minor spawning areas were also designated for the smaller watersheds of Wilson and Brush Creeks (including Sheep Creek).

Land ownership within the Lower Middle Fork Salmon River population is primarily USFS (99.4%) with state (0.23%), and private (0.36%) combined at less than one percent (Figure 5.3-12). The Lower Middle Fork Salmon River is almost entirely contained within the Frank Church River of No Return Wilderness. Streams situated outside the wilderness area are subject to more land management related impacts than wilderness streams. There are no major human population centers in the Middle Fork Salmon River basin and private or state-owned lands within the wilderness are typically resort type developments.

Mining has occurred within the Middle Fork Salmon River watershed, with the scale of operations varying from individual placer operations to large-scale underground gold mines in the Big Creek drainage. Some underground mines were developed throughout the wilderness area, but there are no active mines in the Middle Fork Salmon River watershed. Historically, livestock were raised adjacent to mining camps to provide food and pack animals for hauling. Suitable areas near the mines provided open pasture for grazing although winter livestock production was not possible in the upper watersheds. Today grazing is largely limited to areas around guest ranches for pack animals. Some grazing continues to occur along the middle reach of Camas Creek at Meyers Cove. Timber harvest within the wilderness has been limited to post and pole, firewood, and minimal commercial harvest around the periphery of the wilderness. The primary disturbance affecting timber stands within the Middle Fork watershed is natural wildfire. Today, recreation is the most widespread land use of the watershed.

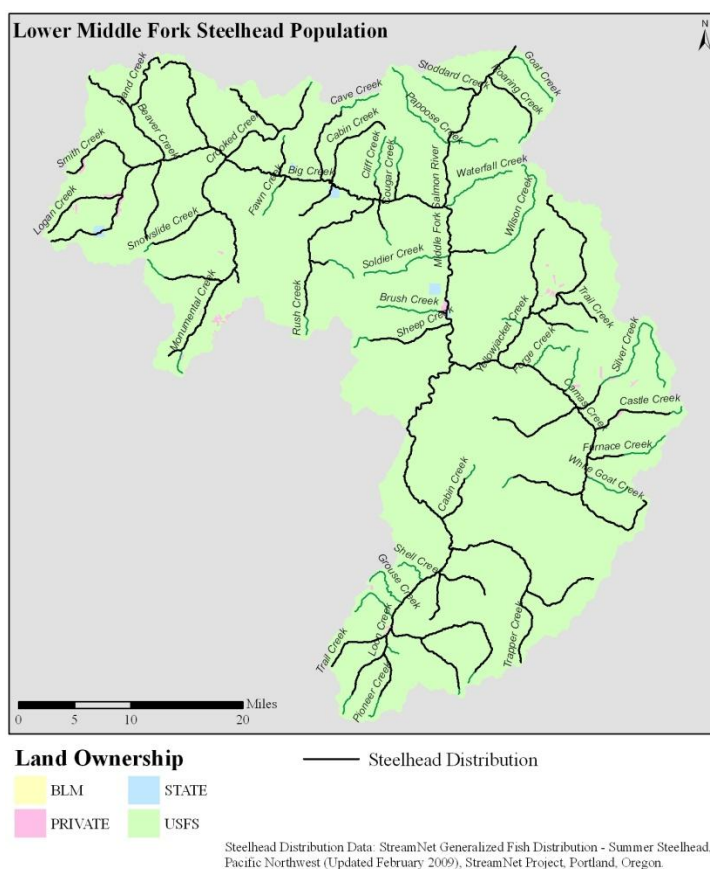


Figure 5.3-12. Land ownership within the Lower Middle Fork Salmon River steelhead population.

IDEQ's 2008 Integrated 303(d)/305(b) Report under the Clean Water Act includes stream segments listed under section 5 (303d streams), section 4c (waters impaired by non-pollutants), and section 4a (EPA approved TMDLs) (IDEQ 2009). Currently, IDEQ does not list any impaired streams segments within the Lower Middle Fork steelhead population (IDEQ 2009).

Current Habitat Limiting Factors: NMFS determined the habitat limiting factors by reviewing multiple data sources and reports on stream conditions. Based on reports and discussions with local fisheries experts and watershed groups, we conclude that the habitat limiting factors for the Lower Middle Fork steelhead population are sediment and migration barriers. Table 5.3-15 summarizes the mechanisms by which each limiting factor affects steelhead, and the management objectives for addressing each limiting factor. This section discusses each limiting factors, using information from USFS reports, IDEQ reports, and the Salmon Subbasin Assessment and Management Plan (USFS 2006; IDEQ 2002, 2009; NPCC 2004; Ecovista 2004).

Areas of concern for habitat conditions are primarily in the Big Creek and Camas Creek drainages. Sediment delivery associated with roads and other activities was identified as a problem in the Monumental Creek drainage (particularly the headwaters to Fall Creek) and in lower Camas Creek (particularly in lower Silver Creek). Mines and their associated roads, dumps, processing facilities, and ponds were considered a problem in several of watersheds (Upper Monumental, Big, and Cabin Creeks). Degradation of habitat conditions was noted from livestock grazing in the Meyers Cove area of Camas Creek (Hardy and Andrews 1989). Road stream crossings may create steelhead passage barriers in Big Creek, and diversions structures create passage barriers in Camas Creek.

Chemical pollutants were also identified by NPCC (2004) as a concern. However, there are no stream segments currently listed for a chemical or mining related pollutant within the Lower Middle Fork steelhead population. No water column data reported by IDEQ (2008) for the Middle Fork Salmon watershed exceeded existing water quality standards.

Table 5.3-15. Primary limiting factors identified for the Lower Middle Fork Salmon River steelhead population, mechanisms by which each limiting factor affects salmonids, and management objectives for addressing each limiting factor.

Limiting Factors	Effects on Salmonids	Management Objectives to Address Limiting Factors
Sediment	Excess sediments can reduce juvenile habitat (rearing), aquatic insect availability (food), and spawning and incubation success (reproduction).	Riparian restoration actions to stabilize streambanks and reduce sedimentation to the stream.
Migration Barriers	Migration barriers such as dams, culverts, and dewatered stream sections can create fish passage barriers. These barriers reduce or eliminate movement of adult and juvenile salmon within a watershed ultimately reducing potential spawning and rearing habitat.	Correction or removal of fish passage barriers.

1. Excess Sediment.

Conditions reported for the Lower Middle Fork Salmon suggests that sediment may have a minor impact on abundance and productivity of steelhead. IDEQ (2008) presented a brief history of stream habitat concerns related to the Thunder Mountain area. They reported that mining activities have occurred in the headwaters of Monumental Creek for over a century with four inactive mines in the Monumental Creek drainage, including the 40-acre Dewey Mine and the 235-acre Sunnyside Mine. Mallet (1974) identified detrimental conditions in Monumental Creek due to mining pollution and siltation. In 1981, activities at the Golden Reef Joint Venture Mine resulted in an influx of sediment pond wastewater into Monumental Creek and Mule Creek. In 1983, several tons of settling pond sludge from the Dewey Mine spilled into Mule Creek. Habitat surveys conducted by IDFG and USFS identified extremely turbid conditions and severely degraded fish habitat (50% less habitat as a result of the spill), and 51% embeddedness. High flows in 1986 flushed out most of the fine sediments, reducing embeddedness to 19 percent in Monumental Creek downstream of the contaminant source. Later, Ries and Burns (1989) documented an improving trend in substrate conditions, but identified sediment effluent as continuing to degrade habitat. More recently, Nelson et al. (1996) noted a highly significant decreasing trend in cobble embeddedness over the 1983 -1994 study period, which indicates improving sediment conditions. Current sediment conditions in the Thunder Mountain area appear stable.

The information presented above suggests that sediment levels have returned to normal although the area may be inherently geomorphically unstable. Although streams in the Monumental Creek watershed are not currently listed as impaired by IDEQ (2009), sporadic sediment problems linked to past mining activities can limit proper habitat function and become a limiting factor given the right circumstances. However, it appears that future sediment events will be less likely to occur if the Thunder Mountain rehabilitation project is completed. The rehabilitation project is slated to occur within the next five years (IDEQ 2008). The Thunder Mountain Mine Restoration Project will include the clean-up of mining operations in the Monumental Creek drainage area (IDEQ 2008). The proposed restoration project includes the removal of the ford at the confluence of Monumental Creek and Coon Creek, which will improve fish habitat and decrease sediment delivery. The proposed project also specifies removal of structures and mining equipment and reshaping and re-vegetation in the Dewey Mine area. The final step in the restoration calls for the removal of road sections leading to the Dewey and Sunnyside Mines. These plans are preliminary and are subject to change during the design process.

Increased sediment levels also occur in Camas Creek due to livestock grazing. In the Camas Creek watershed a livestock exclosure system in conjunction with four hardened stream crossings was established in the mid-90s by the USFS and IDFG. In their annual report Hardy and Andrews (1989) noted degraded riparian and aquatic habitat conditions in Camas Creek associated with a history of agriculture and livestock grazing on private land. These authors believed that habitat conditions limited anadromous fish spawning and rearing (Hardy and Andrew 1989). IDEQ (2008) indicated that the benefits of the livestock exclosure project have been largely negated because of maintenance and continued livestock access within the enclosure. Stream channel improvements have been slow to accrue, if at all, within this project site (IDEQ 2008). Degraded riparian areas and elevated sediment may therefore continue to limit natural production of steelhead in this section of the Camas Creek watershed.

2. Migration Barriers.

Several fish passage barriers in this population may be blocking steelhead from accessing potential habitat. Currently, steelhead migration corridors are considered in good-to-excellent condition in Monumental Creek in the Big Creek drainage. A natural partial barrier exists on Monumental Creek about 16 miles upstream its confluence with Big Creek. Roosevelt Lake was formed by a large mud slide (natural event) that blocked Monumental Creek in 1909 and is a barrier to Chinook salmon spawning but not to steelhead, which are still found above the lake. In the area of the Thunder Mountain access road, IDEQ (2008b) noted several stream crossings that may not allow fish passage at all flows and life stages. In the Camas Creek drainage on Silver Creek there is an earthen dam above the Rams Creek confluence that historically blocked steelhead from accessing upper Silver Creek. The earthen dam has been altered such that steelhead may now be able to access suitable habitat in upper Silver Creek. A push up diversion dam on the mainstem of Loon Creek at the Double D Ranch is a barrier to upstream fish passage and a partial barrier to downstream fish passage. This structure needs to be replaced, diversion rates reviewed, and appropriate screening completed. Migration barriers likely have a small impact on this population.

In summary, stream habitat in the Lower Middle Fork Salmon steelhead population is extensive and in near pristine condition (NPCC 2004, p. 1-35). Factors affecting habitat quality reported for the Lower Middle Fork Salmon River steelhead population are very limited. Because most of the population lies within a protected wilderness, the lower Middle Fork Salmon watersheds have not been significantly impacted by habitat fragmentation associated with land uses, development, and habitat conversion

(NPCC 2004, p. 3-26). Limiting factors for the Lower Middle Fork Salmon River steelhead population largely appear to be legacy effects from mining. Mining impacts should be remediated to maintain aquatic habitats consistent with wilderness designation. The road system and livestock grazing may also create localized sources of sediment and migration barriers.

Potential Habitat Limiting Factors and Threats: Several potential concerns have not yet risen to the level of limiting factors, but needs to be managed to protect steelhead habitat in the Lower Middle Fork Salmon River population area.

1. Reduced flow and habitat access from water diversions – Existing water diversion structures should be reviewed to assure that appropriate fish screens are in place and that adequate water is left instream for fish passage.
2. Degraded water quality from new mineral exploration and development – Without sufficient water quality conservation measures, new mining operations could release sediment and toxic chemicals into surface waters.
3. Degraded habitat from noxious weeds — Spread of noxious weeds can increase soil erosion and decrease native plant density.
4. Degraded habitat conditions from recreational use – Impacts to steelhead habitat from recreational use are currently minimal but should continue to be monitored. Assuring that OHV use is restricted to existing USFS roads and trails will minimize impacts.

Hatchery Programs

[To be developed]

Harvest Management

[To be developed]

Recovery Strategies and Actions

The recovery strategies that address a limiting factor may include both short-term and long-term actions. Short-term actions are projects scheduled to be implemented within the next ten years by a resource management agency or local stakeholder group. Long-term actions are categories of actions that could increase productivity for the population, but for which a specific project has not yet been proposed by a resource management agency or other stakeholder.

Natal Habitat Recovery Strategy and Actions

The recovery strategy for the Lower Middle Fork Salmon River steelhead population is continued protection afforded under wilderness designation while correcting possible sources of sediment from inactive mine sites, roads, and grazing. Continued maintenance of access and system roads will reduce

potential sediment sources. Lastly, migration barriers should be investigated and corrected if warranted.

Priority stream reaches: Given the limited land use impacts within the Lower Middle Fork steelhead population, most stream reaches do not require habitat recovery actions. Priority stream reaches for recovery actions are Monumental Creek, Camas Creek, and Loon Creek. These streams are major spawning areas, have high intrinsic potential for steelhead, and have potential habitat problems.

Habitat actions: The following habitat actions are intended to improve productivity rates and increase the effective capacity for natural smolt production in the Lower Middle Fork Salmon watershed and contribute to maintaining and restoring the VSP parameters while moving the population towards a highly viable status.

1. Continue protection of aquatic habitats in streams within the Frank Church – River of No Return wilderness.
2. Stabilize known sources of sediment from historic mining and reduce sediment delivery from roads and livestock grazing in Monumental, Camas, Big, and Cabin Creeks (Ecovista 2004, p. 52).
3. Assess passage barriers and eliminate barriers blocking access to potential steelhead habitat.

Implementation of Habitat Actions

Responsibility for implementation of the habitat actions for this population lies largely within the jurisdiction of the USFS. Following the existing USFS Land and Resource Management Plan should provide the protection needed for this population. The Nez Perce Tribe is pursuing habitat restoration projects with Payette National Forest in the Big Creek watershed, including the proposed Thunder Mountain Mine Restoration Project. Table 5.3-16 identifies limiting factors, proposed actions, priority locations, short-term projects and associated costs for recovery of the Lower Middle Fork Salmon River steelhead population.

Habitat Cost Estimate for Recovery

The Nez Perce Tribe has proposed mine rehabilitation and riparian restoration projects in the Big Creek watershed, listed in Table 5.3-16. These projects were included among the FCRPS habitat actions. The cost of these projects, should they be implemented, would be \$295,000 in the first year. The Nez Perce Tribe is pursuing funding for these projects as an annual amount for the next 10 years, which would result in \$2,950,000 dollars being spent in the watershed. The cost of the road decommissioning and culvert replacement projects listed in Table 5.3-15 is currently unknown because these projects have not yet received funding. These potential costs have been accounted for in the recovery plan subsection on Big Creek spring/summer Chinook. The habitat cost estimate for Lower Middle Fork steelhead is therefore zero.

Hatchery Recovery Strategy and Actions

[to be added]

Harvest Recovery Strategy and Actions

[to be added]

Table 5.3-16. Recovery Actions Identified for the Lower Middle Fork Salmon River Steelhead Population.

Recovery Actions Identified for the Lower Middle Fork Salmon River Steelhead Population.						
Natal Habitat Recovery Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020
Big Creek Watershed	Chemical pollution/metals	Rehabilitate mine and riparian areas	Mine rehabilitation and 5 acres of riparian restoration	Budgeted costs are \$295,000 per year. This amount of funding is being sought annually from BPA for the next 10 years.	Unknown	Unknown
	Migration barriers	Provide passage	3-4 bridge installations to reconnect habitat	Not yet funded?	Unknown	Unknown
	Sediment	Reduce sediment	5 miles of road decommissioning, 1 culvert replacement	Not yet funded?	Possible channel enhancement projects	Unknown
Hatchery Recovery Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020
Harvest Recovery Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020

5.3.6.4 Upper Middle Fork Salmon River Steelhead Population

Abstract/Overview

The Upper Middle Fork Salmon River steelhead population is currently rated as not viable, with a high abundance/productivity risk. The surrogate B-run population used to estimate the current status of the Upper Middle Fork population is currently rated as high risk. The population is targeted to achieve a desired status of Viable, which requires low abundance/productivity risk. The overall spatial structure and diversity rating is sufficiently low for the population to reach its desired status.

Current Status	Desired Status
High Risk	Viable

The actions identified in this recovery plan to occur over the next 10 years will likely move this population to maintained status, but additional actions to improve survival will be needed for the population to achieve its desired status of viable. Some minor improvements may be made in the spawning and rearing habitat, but the majority of the improvements will need to be made in the migration corridor and estuary. The monitoring and research information collected over the next ten years will provide an important opportunity to complete a more detailed evaluation of the status of the species and will provide additional knowledge to guide the next round of actions under this plan.

Currently, there is a high degree of uncertainty in estimating the nature and timing of a population's response to various recovery strategies, determining the gap between the current status and the desired status, and determining the amount of improvement necessary to achieve the viability target for this population. Due to this uncertainty, it is important to implement an adaptive management strategy, in conjunction with the ESA's five-year status reviews and the actions described in the Research, Monitoring, and Evaluation chapter. If the initial actions do not produce the intended response, the actions will be adjusted to produce the additional needed improvement.

Introduction

This section of the recovery plan compares the population's desired status to its current status, and describes how the population fits into the recovery strategy for the MPG and DPS. The primary sources of information are the ICTRT viability criteria (NMFS 2007b) and the ICTRT's Snake River steelhead status assessment (ICTRT 2008).

Population Status

The Population Status section describes the population's current status as defined in the ICTRT's most current status assessment (ICTRT 2008) where they discussed risk in terms of four viability parameters: Abundance, Productivity, Spatial Structure and Diversity. Other available information was also considered. The section focuses primarily on population Abundance (the total number of adults) and Productivity (the ratio of returning adults to the parental spawning adults). It compares the population's current status to the desired status in terms of both abundance and productivity. It also summarizes Spatial Structure (the amount and nature of available habitat) and Diversity (genetic traits) concerns identified by the ICTRT. Diversity concerns are also discussed in the hatchery section. More details are available in the Snake River steelhead status assessment (ICTRT 2008).

Population Description: The Upper Middle Fork Salmon River population was considered an independent population because it is geographically separated from other spawning areas. Population delineation was also supported by genetic differentiation from lower Middle Fork Salmon River samples and a significant habitat break between the two populations (ICTRT 2003). The population includes fish spawning in the Middle Fork mainstem and its tributaries upstream from Loon Creek (Figure 5.3-13). The Upper Middle Fork Salmon River population is a B-run steelhead population.

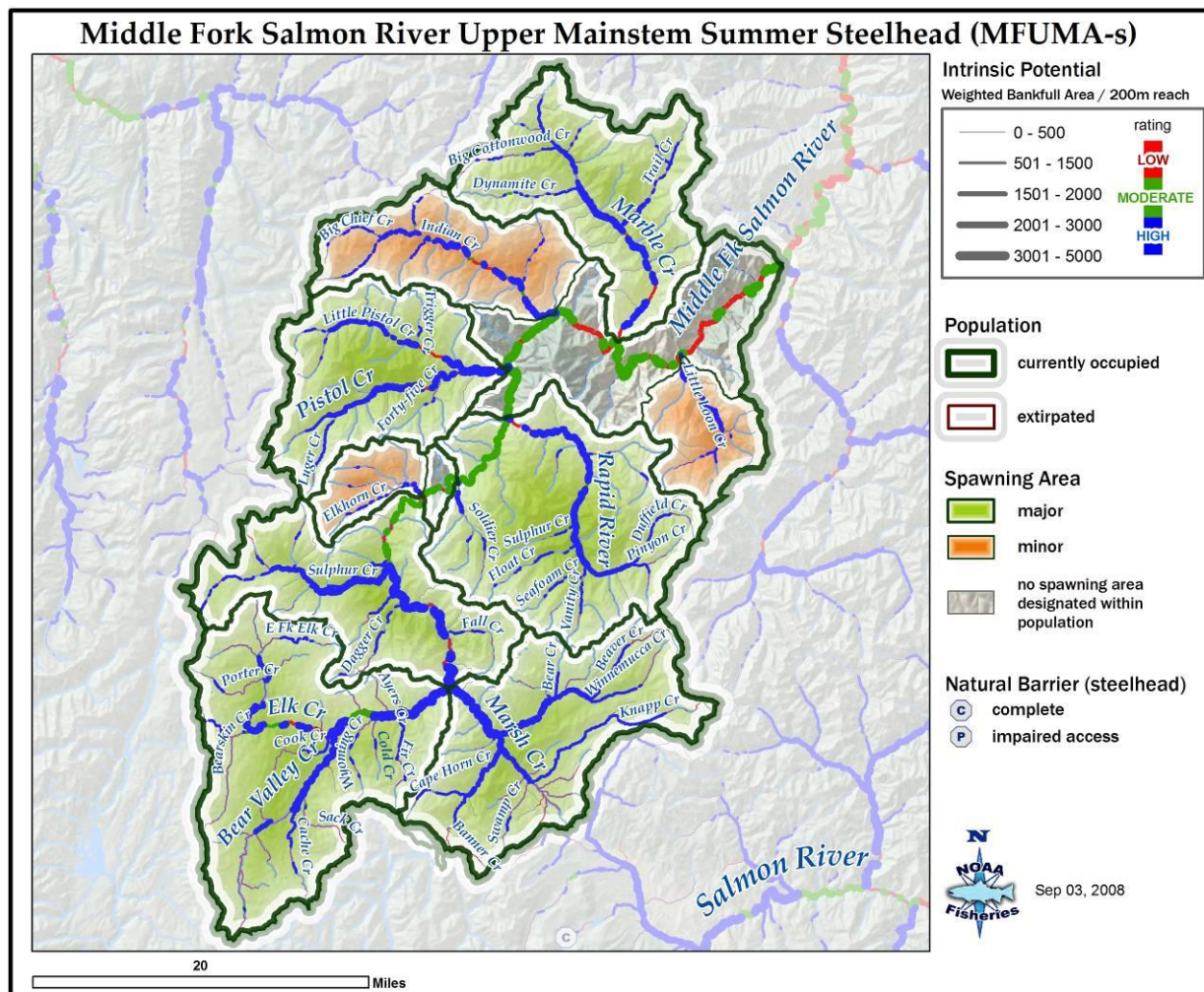


Figure 5.3-13. Upper Middle Fork Salmon River summer steelhead population, with major and minor spawning areas.

The ICTRT (2007) classified the Upper Middle Fork Salmon River population as “intermediate” in size and complexity based on historical habitat potential. A steelhead population classified as intermediate has a mean minimum abundance threshold of 1,000 natural-origin spawners with sufficient intrinsic productivity (≥ 1.14 recruits per spawner at the abundance threshold) to achieve a 5 percent or less risk (“low risk”) of extinction over a 100-year timeframe.

Abundance and Productivity: Direct estimates of current abundance are not available for the Lower Middle Fork Salmon River population. There are no weirs where steelhead escapement for the entire population can be monitored. However, steelhead redds were counted by the IDFG in most years from

1988 to 1998 in several Middle Fork Salmon River tributary reaches (transects did not include all spawning habitat). From 1988 to 1998, total redds counted each year in the surveyed transects ranged from 6 to 99 (Table 5.3-17).

Table 5.3-17. Upper Middle Fork Salmon River summer steelhead population redds counted in survey transects, 1988-1998. Data obtained from Idaho Department of Fish and Game. ("nc" indicates no count).

Transect Area	Year										
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Bear Valley Creek	27	11	62	32	26	28	26	13	10	3	5
Cape Horn Creek	nc	nc	nc	nc	nc	nc	3	0	nc	nc	nc
Marsh Creek	nc	nc	23	1	10	7	10	nc	1	0	0
Sulphur Creek	17	7	14	6	5	18	2	2	3	3	6
Total	44	18	99	39	41	53	41	15	14	6	11

Abundance generally declined across the latter half of the time series, consistent with the pattern observed in the estimates of aggregate B-run natural returns passing Lower Granite Dam on the mainstem Snake River. The IDFG has collected juvenile abundance data from a series of transects within the Upper Middle Fork Salmon River drainages since 1985. On average, 11 transects are surveyed per year within this population (range: 4 to 15 per year). *O. mykiss* parr densities averaged across transects within this population have been relatively constant at low levels since 1990, similar to the levels observed in the annual averages across transects in the adjacent Lower Middle Fork Salmon River population.

Since population-specific abundance estimates are not available for most Snake River steelhead populations, including the Upper Middle Fork Salmon River population, the ICTRT generated preliminary estimates of average population abundance and productivity using annual counts of wild steelhead passing Lower Granite Dam. Estimates were developed for two average surrogate populations to represent both major run types (A and B). These abundance and productivity estimates were then compared to a viability curve for an intermediate-sized Snake River steelhead population (requiring a minimum abundance threshold of 1,000 natural-origin spawners and a productivity of 1.14 recruits per spawner).

The ICTRT used information for the surrogate population for B-run steelhead above Lower Granite Dam to estimate abundance/productivity of the Upper Middle Fork Salmon River steelhead population. The surrogate B-run population has an estimated recent abundance of 345 and productivity of 1.09. It is rated as high risk based on current abundance and productivity, as shown in Figure 5.3-14. The point estimate representing current status lies just below the 25 percent risk curve for intermediate-sized Snake River steelhead populations, indicating a greater than 25 percent risk of extinction over a 100-year timeframe. More specific information about how the abundance and productivity estimates were calculated is included in the ICTRT's steelhead status assessment Appendix B-1 Calculating Representative Abundance and Productivity Estimates for Snake River A and B run Steelhead Populations.

Based on the surrogate B-run population, increases in abundance and productivity will be necessary for the Upper Middle Fork Salmon River population to reach its desired status of viable.

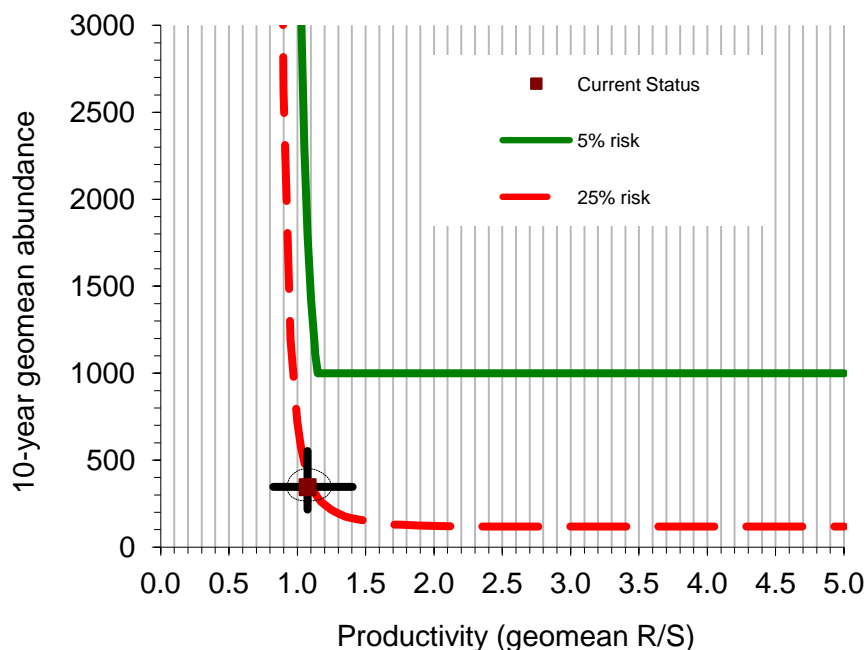


Figure 5.3-14. Snake River B-run surrogate steelhead population current estimated abundance and productivity (A/P) compared to DPS viability curve (1986-2005). Ellipse = 1 SE about the point estimate. Error bars = 90% CI for A, 98% CI for P (if point estimate >1% risk curve, the uncertainty test is <1% probability the combined A/P is at high risk).

Spatial Structure: The ICTRT has identified six major spawning areas (Bear Valley, Marsh Creek, Upper Middle Fork including Sulphur Creek, Rapid River, Pistol Creek, and Marble Creek) and three minor spawning areas (Elkhorn Creek, Indian Creek, and Little Loon Creek) within this population. Spawning is widely distributed across the population. Direct observations of redds or mature adults have been made in a number of the larger tributaries including the Marsh Creek and Bear Valley Creek drainages, Sulphur Creek and Loon Creek. Juvenile steelhead, most likely the progeny of anadromous parents, have been observed in and collected from nearly every tributary to the Middle Fork Salmon River that is large enough to support steelhead. The extensive branching of occupied spawning habitat leads to a very low spatial structure risk, which is adequate for the population to reach its desired status.

Diversity: The major life history strategies historically represented in the population are unknown, but the population is currently classified as consisting only of B-run steelhead. A single genetic sample for the population showed no similarity to Salmon River hatchery samples, and there is no hatchery program in the Middle Fork Salmon River basin. Cumulative diversity risk is therefore low, which is adequate for the population to meet its desired status.

Summary: The Upper Middle Fork Salmon River steelhead population is currently at high risk due to a tentative high risk rating for abundance/productivity. A population-specific monitoring program will be necessary to reduce the uncertainty of this rating. In the absence of population-specific abundance data, we assume that substantial increases are needed in abundance and productivity for this population to reach its desired status of viable. Table 5.3-18 shows the population's current and desired status in

terms of cumulative abundance/productivity and spatial structure/diversity risks. A complete version of the ICTRT's draft status assessment for Snake River Basin steelhead populations is available upon request from NMFS.

Table 5.3-18. Upper Middle Fork Salmon River steelhead population risk ratings integrated across the four viable salmonid population (VSP) metrics. The population does not meet population-level viability criteria.

		Spatial Structure/Diversity Risk			
		Very Low	Low	Moderate	High
Abundance/ Productivity Risk	Very Low (<1%)	HV	HV	V	M
	Low (1-5%)	V	V	V	M
	Moderate (6 – 25%)	M	M	M	HR
	High (>25%)	HR	HR Upper Middle Fork Salmon River	HR	HR

Viability Key: HV – Highly Viable, V – Viable, M – Maintained, and HR – High Risk; shaded cells – do not meet viability criteria, with darkest cells signifying the highest risk of extinction. Percentages refer to risk of extinction over 100 years. Arrow points to desired risk status.

Limiting Factors and Threats Specific to Population

This section describes the limiting factors and threats that are specific for the population. The population is also affected by limiting factors and threats in the mainstem Columbia/Snake River corridor, estuary, and plume, and by climate change. Section 5.1.1 summarizes regional-level factors that affect all Idaho Snake River steelhead populations.

Natal Habitat

Habitat Conditions: The Upper Middle Fork steelhead population includes the Middle Fork Salmon River watersheds upstream from Loon Creek. Major watersheds within the Upper Middle Fork include Marble Creek, Elkhorn Creek, Rapid River, Pistol Creek, Sulphur Creek, Marsh Creek, and Bear Valley Creek. The geographic area encompassed within this population has a drainage area of approximately 1,144 square miles (2,964 km²).

The Middle Fork Salmon River subbasin has a broad climate range with prevalent Pacific maritime regime in the western watershed to a more continental regime in the eastern area (IDEQ 2008). For the Middle Fork Salmon River subbasin, most precipitation occurs as snow during winter and early spring, while summers are generally dry. Western portions of the subbasin generally receive more precipitation. Stream flow peaks during the spring months from snow melt. Aquatic habitat conditions in the Middle Fork were rated as good to excellent (NPCC 2004, p. 2-138). There are about 1,476 km of stream within the population with about 1,148 km downstream of natural barriers.

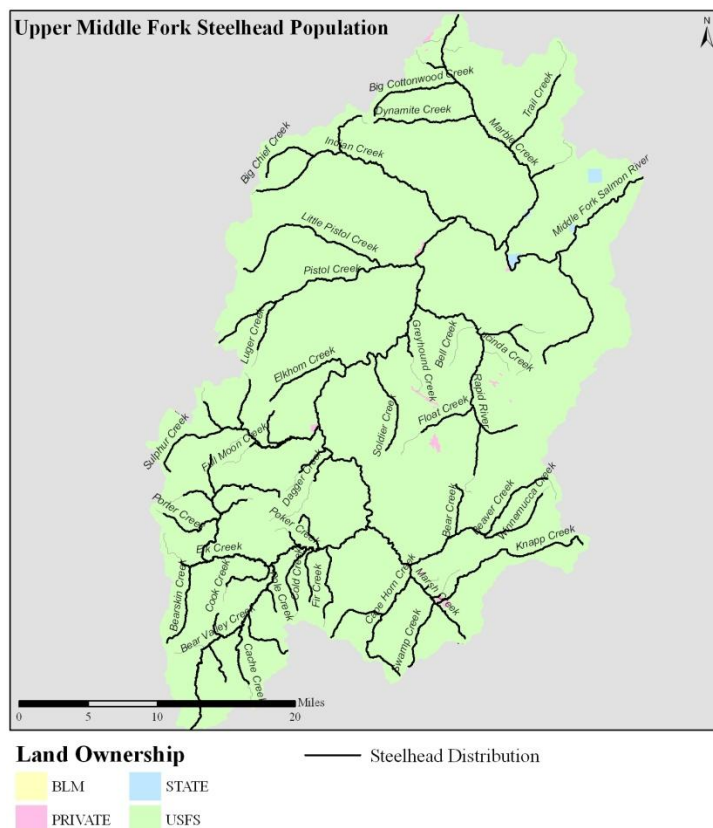


Figure 5.3-15. Land ownership and steelhead distribution in the Upper Middle Fork Salmon subbasin.

Land ownership within Upper Middle Fork Salmon River population is primarily US USFS (99.57%) with state (0.20%), and private (0.24%) combined at less than one percent (Figure 5.3-15). The Upper Middle Fork Salmon River is almost entirely contained within the Frank Church River-of-No-Return Wilderness. Streams situated outside the wilderness area are subject to more land management related impacts than wilderness streams. There are no major human population centers in the Middle Fork Salmon River basin, and private or state-owned lands within the wilderness are typically resort type developments.

The Idaho Department of Environmental Quality (IDEQ) is required by the Clean Water act to assess all surface waters in Idaho and determine whether they meet state water quality standards and support their beneficial uses (e.g., cold water aquatic life and salmonid spawning). The results of this assessment are included in the Integrated 03(d)/305(b)) Report.

Table 5.3-19 includes stream segments in this population that are not fully supporting their assessed beneficial uses (impaired stream segments) and are listed in IDEQ's 2008 Integrated Report under the Clean Water Act, section 5 (impaired waters that need a TMDL), section 4c (waters impaired by non-pollutants), and section 4a (impaired waters that have an EPA-approved TMDL) (IDEQ 2009).

Table 5.3-19. Stream segments identified in the Upper Middle Fork Salmon steelhead population from Sections 4a, 4c, and 5 of the IDEQ 2008 303(d)/305(b) integrated report (IDEQ 2009).

Waterbody	Impairment/Cause	Stream Miles
Section 5-303(d)-Impaired Waters Needing a TMDL		
Elkhorn Creek - source to mouth	Sedimentation/Siltation	29
Elkhorn Creek - source to mouth	Water temperature	29
Bear Valley Creek - source to mouth	Sedimentation/Siltation	7.36
Bear Valley Creek - source to mouth	Water temperature	11.23
Bear Valley Creek - source to mouth	Sedimentation/Siltation	11.23
Elk Creek - source to mouth	Sedimentation/Siltation	1.84
Marsh Creek - source to Knapp Creek	Combined Biota/Habitat Bioassessments*	20.71
Asher Creek - source to mouth	Combined Biota/Habitat Bioassessments	3.34
Camp Creek - source to mouth (T12N, R11E, Sec. 11)	Combined Biota/Habitat Bioassessments	1.62

Waterbody	Impairment/Cause	Stream Miles
Beaver Creek - Bear Creek to mouth	Combined Biota/Habitat Bioassessments	14.13
Section 4c-Waters Impaired by Non-pollutants		
Elkhorn Creek - source to mouth	Other flow regime alterations	29.01
Section 4a- Impaired Waters with EPA-Approved TMDLs		
No Listings		0.0

*The combined biota/habitat bioassessment cause is assigned to a waterbody on the 303(d) list (Category 5 of the integrated report) when bioassessment scores indicate poor habitat and/or aquatic community conditions and there is insufficient information to determine the cause(s) of the poor bioassessment scores.

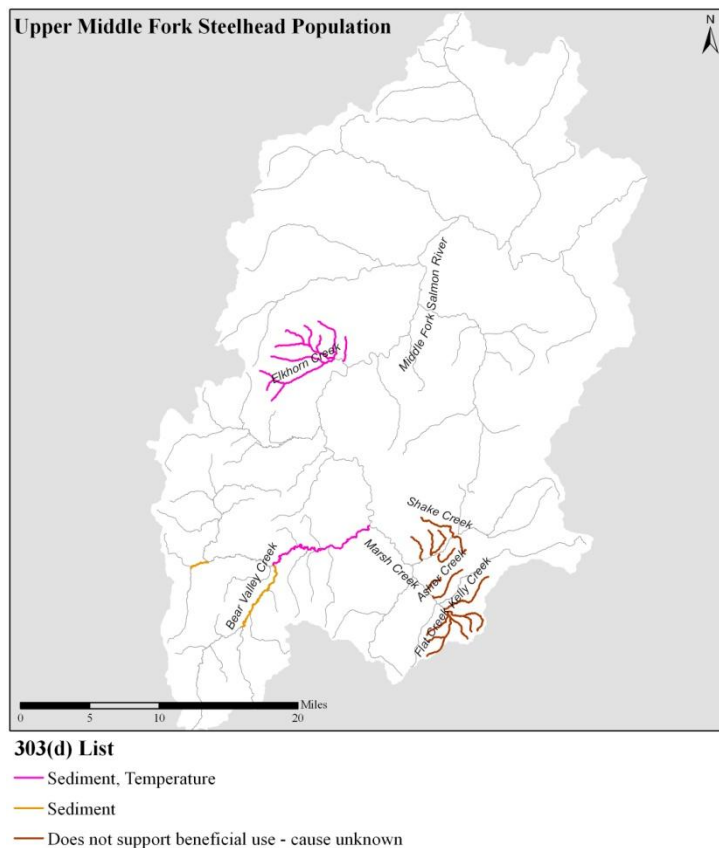
Current Habitat Limiting Factors: NMFS determined the habitat limiting factors by reviewing multiple data sources and reports on stream conditions. Stream habitat in the Upper Middle Fork is well protected and in relatively good condition. Past land use activities that degraded stream habitat, such as mining and intensive livestock grazing, have now ceased. Potential habitat limiting factors such as sediment and temperature have largely been addressed and continue to improve.

The following section discusses the potential limiting factors for habitat within the population, using information from IDEQ reports and the Salmon Subbasin Assessment and Management Plan (IDEQ 2008a, NPCC 2004, Ecovista 2004).

1. Excess Sediment.

Fine sediment can harm steelhead and their habitat by smothering redds and spawning gravels, filling in pools used by juveniles for cover, or reducing the availability of aquatic insects (food). Excess fine sediments can affect abundance and productivity by reducing spawning habitat quality, incubation success, and by decreasing juvenile rearing habitat quality.

As indicated by IDEQ (2009), some streams in the Upper Middle Fork Salmon have been listed for sediment (Figure 5.3-16). Bear Valley Creek, Elkhorn Creek, and a small segment of Bearskin Creek (an Elk Creek tributary) are listed for sediment totaling about 38 stream miles. In Bear Valley Creek, there is a history of mining and livestock grazing that has contributed to excess sediment in the system. These land use activities no longer occur although the legacy effects are still seen in channel and substrate conditions. As reported by IDEQ (2008), between 1956 and 1959, dredge mining of private land occurred in Upper Bear Valley Creek, resulting in the obliteration of 17,000 linear feet of Bear Valley Creek and 10,000 linear feet of tributary channels. Later, in 1969 an attempt was made to correct a portion of the dredged area. The lower reaches of Casner Creek and the dredged section of Bear Valley Creek were diverted and channelized. The diversion failed several times, most notably in a 1984 flood event that resulted in massive downstream erosion and erosion of tailing materials. As a result, the Shoshone-Bannock Tribes became involved and a more comprehensive remediation project was initiated. This second rehabilitation effort (1984 to 1989) has brought about an upward trend in water quality (USFS 2000, as cited in IDEQ 2008).



Data: Idaho Department of Environmental Quality. Idaho 2008 305(b)/303(d) Integrated Report (Final).

Figure 5.3-16. Impaired stream reaches in the Upper Middle Fork Steelhead population (IDEQ 2009).

completed in 2001, and a significant improvement has accrued in some areas. Additionally, the Shoshone-Bannock Tribes have initiated streambank stabilization projects and riparian planting to alleviate excess erosion. There has been no grazing in the watershed since 2001, when the livestock allotments were retired.

The mainstem segment of Bear Valley Creek has shown improvement over the years with a reduction in percent surface fines and an increase in streambank stability to near reference conditions (IDEQ 2008). The segments have been recommended for delisting and/or movement in to category 4b of IDEQ's integrated report. (Stream segments in category 4b do not require a TMDL because other pollution control measures are in place and the streams are expected to meet water quality standards in the near future). Similarly, Bearskin Creek (an Elk Creek tributary) has also been recommended for movement into category 4b of the integrated report. Streambanks in Bearskin are stable (91%-100%) yet percent fines are high (71%-95%). The amount of high sediment in Bearskin Creek may be a combination of naturally high sediment loads and low stream gradients (41% response reaches) combined with past land management activities. In Elkhorn Creek, IDEQ (2008) found little evidence of sediment levels above natural conditions. In North Fork Elkhorn Creek, outside the wilderness, streambanks were over 98 percent stable and percent surface fines were 21 percent, which is comparable to reference conditions. An old mine site approximately 100 meters from the stream upstream of a BURP site showed not sediment impacts to the stream. Aerial photos analyzed by IDEQ showed no significant mass wasting events or human influenced sources of sediment. IDEQ has recommended that Elkhorn Creek be delisted for sediment and temperature (IDEQ 2008).

IDEQ (2008) provided a history of livestock grazing in the Bear Valley Creek area. Early records of exact numbers and locations of livestock grazing do not exist. By 1930, there already were reports of overgrazing (Boise and Challis National Forests 1975, as cited in IDEQ 2008). In the 1960s, a deferred rest rotation system of pasture management was initiated on the Bear Valley C&H Allotment. Sheep grazing declined during the mid-60s to mid-70s, and in 1995 the area grazed by sheep was converted into a cattle allotment.

Monitoring of the area resulted in stricter livestock grazing allotment requirements in the Bear Valley and Elk Creek areas, which made it more difficult for the permittees to continue grazing in this area. In the upper watershed, particularly within the Bear Valley Creek watershed, including Elk Creek, the Bonneville Power Administration negotiated a buyout of grazing allotments that were identified as a significant cause of sediment loading from streambank erosion. This buyout began in 1998 and was

Due to the improving sediment conditions, it is likely that the sediment-impaired waters in the Upper Middle Fork will attain water quality standards in a reasonable period with passive restoration. With USFS leadership this is a reasonable approach. Monitoring with adaptive management should be adequate to assure attainment of sediment reduction goals.

2. Elevated Water Temperature.

Elevated water temperatures may adversely affect salmonid growth and development, alter life history patterns, induce disease, or exacerbate competitive predator-prey interactions (Spence et al. 1996). IDEQ (2009) has indicated stream temperature impairments for Elkhorn and Bear Valley Creeks (Figure 5.3-16). Bear Valley and Elkhorn Creeks are listed for temperature on about 36 miles of stream. In Elkhorn Creek, IDEQ (2008) found that stream temperatures met criteria for state cold water biota and salmonid spawning seasons (steelhead, Chinook, and bull trout) but did not meet federal standards for bull trout from June to September. An IDEQ (2008) assessment of natural shade conditions for the watershed suggests that stream temperature is near natural background temperature. For steelhead, NMFS does not consider stream temperature in Elkhorn Creek to be a limiting factor.

In Bear Valley Creek, stream temperature is listed as impairing beneficial uses from the confluence with Elk Creek downstream to Marsh Creek. IDEQ plans to conduct future analysis of temperatures in this stream reach (IDEQ and BNF 2010). IDEQ (2008) did note that there was evidence of accelerated stream bank recession rates in a number of streams including Bear Valley Creek, potentially resulting in increased channel width. Increased thermal loading is frequently caused by alteration of riparian vegetation and/or channel geometry. Water temperature recorded in lower Bear Valley Creek from 14 September 2000 through 10 September 2001 showed that temperature peaked at 18.9°C (66°F) on 4 July 2001 (Zurstadt and Stephan 2004). A peak summer temperature of 18.9°C, while above optimal sustained temperatures for steelhead rearing, is not likely to limit the productivity of the population. Furthermore, bank stability is expected to increase over time as the stream recovers from past land uses, which will likely lead to reduced channel width and a possible decrease in summer stream temperatures.

3. Passage Barriers.

In the past, culverts on Casner, Cub, Fir, and Sack Creeks did not allow fish passage, but all impassable culverts have now been replaced. In 2005, the USFS and Valley County replaced culverts on Casner and Cub Creeks to allow fish passage (IDEQ 2008). The USFS replaced a culvert on FS Road 579 at Fir Creek with a bridge in 2009, and replaced 3 culverts on FS Road 582 at Sack Creek with a bridge in 2010. Passage barriers are no longer a limiting factor.

Summary of Current Habitat Limiting Factors and Threats

Aquatic habitats in most of the Upper Middle Fork Salmon steelhead population are abundant and in near pristine condition (NPCC 2004, p. 1-35). Factors affecting habitat quality reported for the Upper Middle Fork Salmon River steelhead population appear to be few. Because much of the population lies within a protected wilderness, the Upper Middle Fork Salmon has not experienced widespread habitat fragmentation associated with land use, development, and habitat conversion (NPCC 2004, p. 3-26).

Active restoration in some parts of the Upper Middle Fork has occurred to correct the effects of historic mining and livestock grazing. Cessation of these land use activities and habitat rehabilitation efforts over the last twenty years have allowed habitats to recover such that sediment levels are

returning to near reference conditions. Priorities for habitat recovery should be continued protection of habitat, control of potential sources of sediment, and analysis of temperature conditions in Bear Valley Creek.

Potential Habitat Limiting Factors and Threats: Several potential concerns have not yet risen to the level of limiting factors, but needs to be managed to protect steelhead habitat in the Upper Middle Fork Salmon River population area.

1. Altered hydrology due to water diversions – It is unknown whether or not the handful of small water diversions in the Upper Middle Fork population bypass adequate flows, provide for fish passage, and have adequate screening in place.
2. Degraded riparian habitat due to grazing impacts – Assuring that the ESA section 7 consultations on USFS grazing allotments remain current should minimize any effects from grazing.
3. Habitat degradation from noxious weeds – The spread of noxious weeds can increase soil erosion and decrease native plant density.
4. Habitat degradation from recreational use – Impacts to steelhead habitat from recreational use are currently minimal but should continue to be monitored.

Hatchery Programs

[To be developed]

Harvest Management

[To be developed]

Recovery Strategies and Actions

The recovery strategies that address a limiting factor may include both short-term and long-term actions. Short-term actions are projects scheduled to be implemented within the next ten years by a resource management agency or local stakeholder group. Long-term actions are categories of actions that could increase productivity for the population, but for which a specific project has not yet been proposed by a resource management agency or other stakeholder.

Natal Habitat Recovery Strategy and Actions

The strategy for dealing with habitat limiting factors is continued protection afforded under wilderness designation along with identification and control of possible sources of sediment from inactive mine sites and roads. Continued maintenance of access and system roads will reduce potential sediment sources and prevent potential migration barriers (e.g., culverts) from developing. Analysis of stream temperature, channel condition, and riparian function in Bear Valley Creek should prove useful in determining if active and passive rehabilitation efforts to date have been sufficient to recover aquatic habitat.

Priority stream reaches: The high priority stream reaches are those with intrinsic potential for steelhead in the major and minor spawning areas, shown in Figure 5.3-15.

Habitat actions: The following habitat actions are intended to improve productivity rates and increase the effective capacity for natural smolt production in the Upper Middle Fork Salmon watershed.

1. Protect existing habitat to allow sediment levels and bank stability to return to reference conditions over time and to prevent any new degradation.
2. Control potential source of sediment from roads and inactive mine sites.

No habitat projects are currently proposed for the Upper Middle Fork Salmon River steelhead population.

Implementation of Habitat Actions

Implementation of the habitat actions for this population will occur primarily through efforts of the USFS, the Shoshone-Bannock Tribes, and local stakeholder groups. Following the existing USFS Land and Resource Management Plan should provide the protection to habitat needed for this population. IDFG has management authority for fish and wildlife in this area. No habitat projects are currently proposed for the Upper Middle Fork Salmon River steelhead population.

As described above, several habitat restoration projects have been completed within this population. IDEQ (2008b) identified 24 projects directed at improving aquatic habitat. Most of the projects identified are located in the Bear Valley Creek and Elk Creek watersheds. As indicated by Table 5.3-20 below, mitigation projects related to mining, grazing and roads are the most common types of projects implemented.

Table 5.3-20. Partial list of habitat actions to improve aquatic habitats in the Upper Middle Fork Salmon steelhead population (IDEQ 2008b).

Year	Habitat Actions
USFS/Trout Unlimited (TU)/IDFG 1990	Upper Bear Valley Creek and Cache Creek: Stabilized sediment source adjacent to Bear Valley Creek between Mace and Sheep Trail Creek and planted willow cuttings behind revetments for 300 feet.
USFS/BPA 1990	Upper Bear Valley Creek: Put in 21 log and rock structures on Bear Valley Creek between Cub Creek and Sheep Trail Creek. Increased bank stability and decreased channel widening.
USFS/BPA 1990	Lower Bear Valley Creek: Constructed 3 large barbs on an outside meander to control excess streambank erosion and allow for establishment of riparian species.
USFS/BPA 1990-1991	Bear Valley Creek: 4,576 willows were cut, rooted and planted on Bear Valley Creek in the Cub Creek area to increase riparian density and bank stability.
USFS/BPA 1991	Elk Creek: Sedge and willow planting in streambanks of new channel.
USFS/BPA 1991	Bear Valley Creek: Tree deflectors on 400 ft of streambank near Mace Creek to deflect flow away from streambanks.
USFS/BPA/IDEQ/TU/IDFG 1991	Bear Valley Creek: Adopt a Stream program planted willow cuttings and anchored logs along Bear Valley Creek between Poker Meadow Bridge and Fir Creek.
BPA 1991	Bear Valley Creek: 57 rock and log structures were installed on Bear Valley Creek downstream from Sheep Trail to create habitat complexity.
USFS/BPA 1991	Cold Creek and Wyoming Creek: 2 rock check dams constructed in Cold Creek. Relocated 300 feet of Wyoming Creek road to prevent sediment transport to stream.
USFS/BPA 1992	Bear Valley Creek: 2.25 miles of fence constructed in Ayers Meadow to protect sensitive channel.
USFS/BPA 1992	Bear Valley: 5.25 miles of fence constructed to protect stream channel during grazing.

Year	Habitat Actions
USFS/BPA 1993	Bear Valley: Creek: 2.3 miles of fence constructed in Poker meadows.
TU/IDFG/USFS 1993-1994	Bear Valley Creek: Willow, sedge and rush planting.
1997-1998 USFS/TU	Lower Elk Creek and Bear Valley Creek: Log barbs installed along cutbank in 2 reaches on Elk Creek and 4 reaches on Bear Valley Creek to encourage bank building and vegetative recolonization.
2000 IDFG/Shoshone Bannock Tribes	Bear Valley and Elk Creek: Protection of salmon spawning habitat (\$310,000).
2001 BPA/USFS	Bear Valley and Elk Creek: All grazing allotments retired (e.g. Elk Creek allotment retired in 2000, 48,000 acres in allotment-grazing permit purchased by BPA for \$145,000 and then allotment retired).
2003 USFS	Bear Valley Roads Improvement Project: Improvement and maintenance of Bear Valley roads.
2004 IDFG, TU, Borah High School, USFS, NOAA,	Bear Valley Creek: Planted willows and potentilla on 10 hardened livestock stream crossings to enhance streamside vegetation and improve streambank stability (Five Star Restoration Project/NOAA Community-based Restoration Program).
2004 USFS	Bear Valley Creek: Fir Creek Campground fence constructed to prevent trampling of banks.
2005 USFS	Bear Valley Creek riparian restoration: Planting of hardened crossings (\$125,000).
2005 USFS/Valley County	Casner Creek/Cub Creek: Culvert replacement to restore fish passage to 4 miles of stream habitat.
2006 USFS	Bear Valley Creek: Burn area mitigation.
2007	Casner Creek Stream Mitigation: Project to mitigate prior straightening of creek during dredge mining era.
2008	FS Road 579 and 582 Road Work: Relocation of 0.1 mile of Road 582, installed 9-14 new culverts, insloped 500 feet of road at milepost 22.76 to prevent sediment delivery to stream, aligned 0.2 miles of road at milepost 24..83. Insloped about 400' of road on FS Road 579 at milepost 12.39, insloped 300' of road at milepost 12.67 and installed two new culverts.

Habitat Cost Estimate for Recovery

No habitat projects are currently proposed for the Upper Middle Fork Salmon River steelhead population so no short-term habitat costs are associated with the population.

Hatchery Recovery Strategy and Actions

[to be added]

Harvest Recovery Strategy and Actions

[to be added]

5.3.6.5 Panther Creek Steelhead Population

Abstract/Overview

The Panther Creek steelhead population is currently rated as not viable, with a high spatial structure risk and a moderate abundance/productivity risk. The surrogate A-run population used to estimate the current status of the Panther Creek population is currently rated at moderate risk. The Panther Creek population is targeted to achieve a desired status of Viable, which requires low abundance/productivity risk and no higher than moderate spatial structure risk. The diversity rating is sufficiently low for the population to reach its desired status.

Current Status	Desired Status
High Risk	Viable

There are no specific habitat actions identified in this recovery plan that will occur over the next 10 years so it is unlikely this population will achieve the desired status. Specific actions will need to be developed. Opportunities for improving survival will likely need to occur both in natal habitat and in the mainstem river migration corridor. Some of these additional recovery actions may be identified and implemented in the near term. A major opportunity for identifying additional actions to increase survival will occur after the analysis of the information that is being collected during the 10-year term of the 2008 FCRPS BiOp, the U.S. v. Oregon Agreement, and the Pacific Salmon Treaty. The monitoring and research information collected during this ten-year period, particularly in the mainstem rivers, will provide an important opportunity to reevaluate the status of the species and will provide additional knowledge that will guide the next round of actions under this recovery plan.

Currently, there is a high degree of uncertainty in estimating the nature and timing of a population's response to various recovery strategies, determining the gap between the current status and the desired status, and determining the amount of improvement necessary to achieve the viability target for this population. Due to this uncertainty, it is important to implement an adaptive management strategy, in conjunction with the ESA's five-year status reviews and the actions described in the Research, Monitoring, and Evaluation chapter. If the initial actions do not produce the intended response, the actions will be adjusted to produce the additional needed improvement.

Introduction

This section of the recovery plan compares the population's desired status to its current status, and describes how the population fits into the recovery strategy for the MPG and DPS. The primary sources of information are the ICTRT viability criteria (NMFS 2007b) and the ICTRT's Snake River steelhead status assessment (ICTRT 2008).

Population Status

The Population Status section describes the population's current status as defined in the ICTRT's most current status assessment (ICTRT 2008) where they discussed risk in terms of four viability parameters: Abundance, Productivity, Spatial Structure and Diversity. Other available information was also considered. The section focuses primarily on population Abundance (the total number of adults) and Productivity (the ratio of returning adults to the parental spawning adults). It compares the population's current status to the desired status in terms of both abundance and productivity. It also summarizes Spatial Structure (the amount and nature of available habitat) and Diversity (genetic traits)

concerns identified by the ICTRT. Diversity concerns are also discussed in the hatchery section. More details are available in the Snake River steelhead status assessment (ICTRT 2008).

Population Description: This population includes the Panther Creek drainage, as well as main Salmon River tributaries from Panther Creek downstream to Chamberlain Creek (not including the Middle Fork Salmon River) (Figure 5.3-17). The primary main Salmon River tributaries in the population are Owl Creek, just downstream from Panther Creek, and Horse Creek. Steelhead in Panther Creek may have been largely eliminated in the 1950s due to water quality impacts from the Blackbird Mine (USFS 2008); however, steelhead persisted in Owl Creek and other main Salmon River tributaries. Extensive mine site reclamation activities over the past 15 years have partially restored water quality in Panther Creek and its tributaries, and steelhead are likely recolonizing the upper Panther Creek drainage. The Panther Creek population is an A-run population.

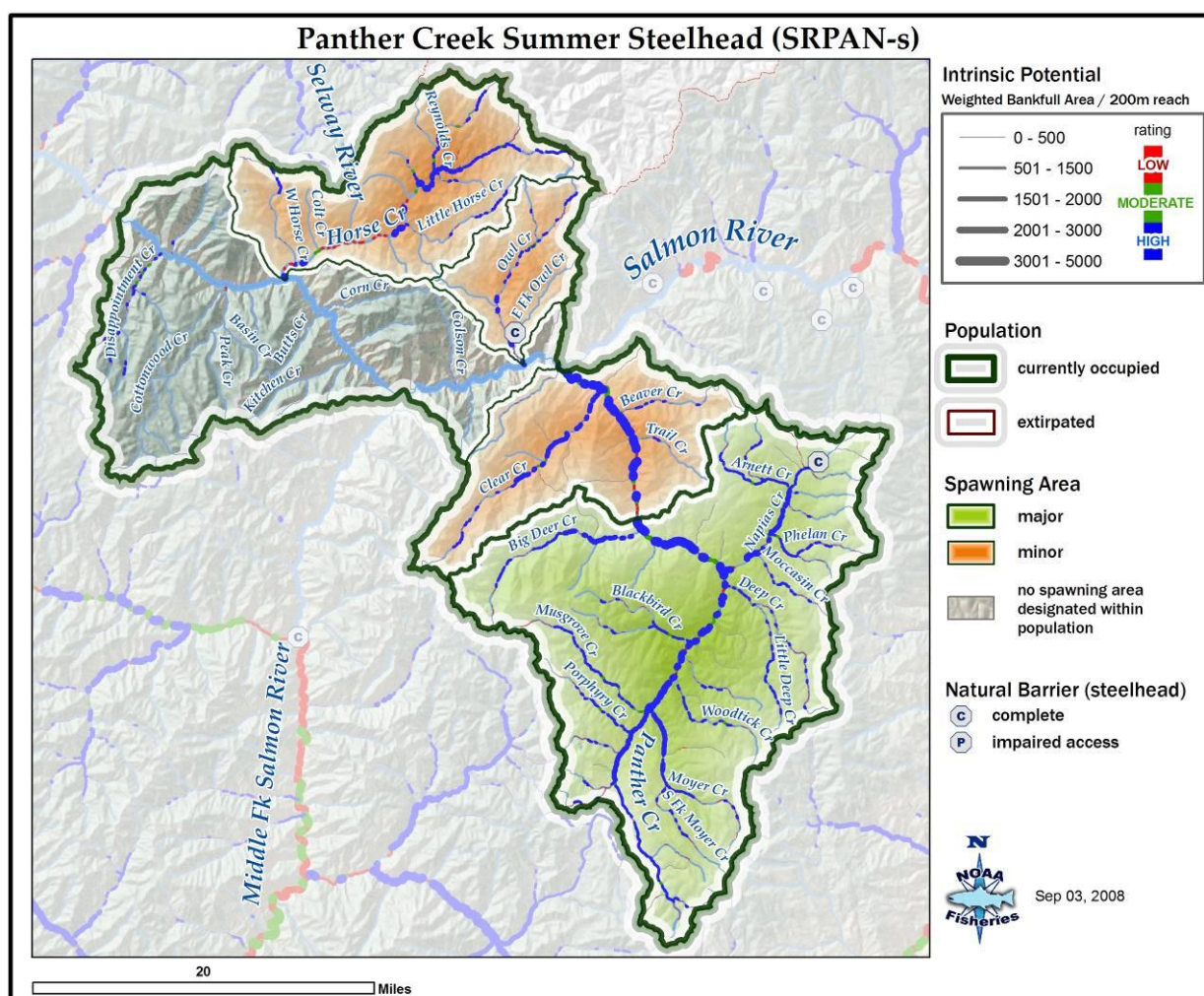


Figure 5.3-17. Panther Creek steelhead population, with major and minor spawning areas.

The ICTRT classified the Panther Creek population as “basic” in size and complexity based on historical habitat potential (ICTRT 2007). A steelhead population classified as basic has a mean

minimum abundance threshold of 500 natural-origin spawners with sufficient intrinsic productivity to achieve a 5 percent or less risk (“low risk”) of extinction over a 100-year timeframe.

Abundance and Productivity: Most Snake River steelhead populations (including all of the Idaho populations) do not have direct estimates of annual spawning escapements. The ICTRT generated preliminary estimates of average population abundance and productivity for these Snake River populations using annual counts of wild steelhead passing Lower Granite Dam. Estimates were developed for two average surrogate populations to represent both major run types (A and B). These abundance and productivity estimates were then compared to a viability curve for an intermediate-sized Snake River steelhead population (requiring a minimum abundance threshold of 1,000 natural-origin spawners and a productivity of 1.14 recruits per spawner).

The ICTRT used the surrogate population for A-run steelhead above Lower Granite Dam to estimate the abundance/productivity of the Panther Creek steelhead population. The surrogate population has an estimated recent abundance of 556 and productivity of 1.86. It is rated as Moderate Risk based on current abundance and productivity, as shown in Figure 5.3-18 (25% or less risk of extinction over a 100-year timeframe). Although the current estimate of intrinsic productivity is above the minimum threshold for low risk, the current average natural abundance (recent 10-year geometric mean) is well below the ICTRT minimum threshold value of 1,000. More specific information about how the abundance and productivity estimates were calculated is included in the ICTRT’s steelhead status assessment Appendix B-1 *Calculating Representative Abundance and Productivity Estimates for Snake River A and B run Steelhead Populations*.

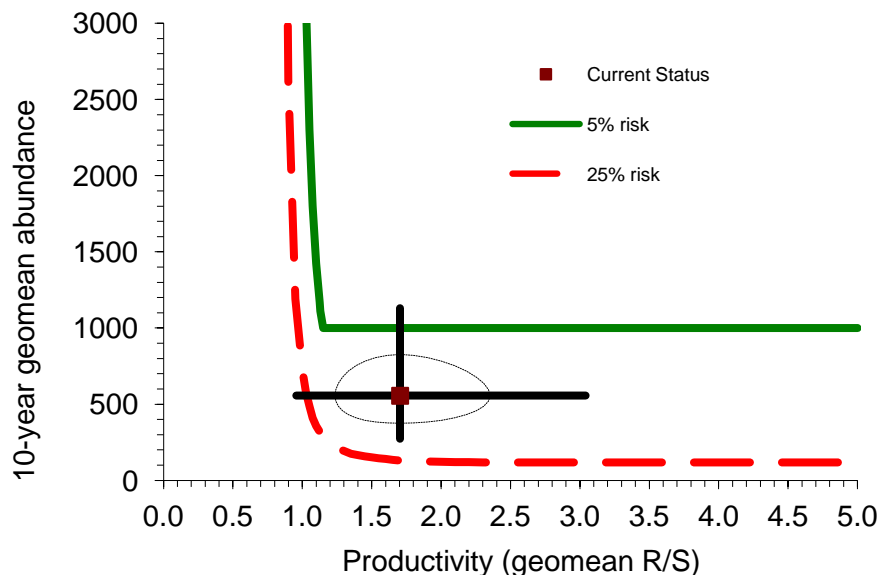


Figure 5.3-18. Snake River A-run surrogate steelhead population current estimated abundance and productivity (A/P) compared to DPS viability curve (1986-2005). Ellipse = 1 SE about the point estimate. Error bars = 90% CI for A, 98% CI for P (if point estimate >1% risk curve, the uncertainty test is <1% probability the combined A/P is at high risk).

Based on the surrogate A-run population, the ICTRT gave this population a tentative abundance/productivity rating of moderate risk. However, because of the history of mining-related

habitat degradation in Panther Creek, the A-run surrogate population likely over predicts abundance for this population.

Spatial Structure: The ICTRT has identified one major spawning area (Upper Panther Creek) and three minor spawning areas (Lower Panther Creek, Owl Creek, and Horse Creek) within the Panther Creek steelhead population. All three historic minor spawning areas are occupied, but the Upper Panther major spawning area was classified by the ICTRT (2009) as unoccupied, due to the possible elimination of the steelhead from this area by heavy metal contamination from the Blackbird Mine. The ICTRT (2009) therefore gave the population a high spatial structure risk. Because water quality has improved in Panther Creek after extensive mine reclamation work, steelhead may again be spawning in upper Panther Creek and its tributaries. Steelhead/rainbow trout juveniles have recently been found in Deep, Little Deer, Big Deer, South Fork Big Deer, and lower Blackbird Creeks (USFS 2008). Documentation of steelhead spawning in Upper Panther Creek would reduce the population's spatial structure risk to low. Spatial structure risk needs to be moderate for this population to meet its desired status.

Diversity: The diversity risk for this population is driven by the extensive anthropogenic impacts to a major part of the population and by the history of past hatchery releases in Panther Creek. The elimination of steelhead from upper Panther Creek has altered distribution across habitat types and may have influenced major life history strategies. Distribution across different habitat types has changed substantially in that the distribution across the Southern Forested Mountains ecoregion has shrunk with the loss of the Upper Panther major spawning area. The effect of mine-related habitat impacts on major life history strategies or pathways is unknown but may be significant due to the range and duration of anthropogenic impacts to stream habitat in upper Panther Creek. It is currently presumed that only A-run type fish historically occupied the population.

There is currently no hatchery program in this population, but there have been hatchery releases in the past in the Panther Creek drainage. In 1977, and from 1982 to 1989, either steelhead fry, pre-smolts, smolts or adults (or combinations of these life-stages) were released into Panther Creek. The fish released were from the Pahsimeroi and Sawtooth Fish Hatcheries. The Pahsimeroi Fish Hatchery steelhead program was founded from Hells Canyon A-run stock and the Sawtooth Hatchery program was based on both local and Hells Canyon stocks. The number of smolts released each year from 1985 to 1988 ranged from 237,900 to 299,700. Numbers of adults released each year from 1983 to 1986 ranged from 121 to 677. More recently, eyed steelhead eggs were planted in Panther Creek for supplementation purposes from 1992 to 1996. The diversity of the natural population may have been substantially influenced by these hatchery releases, particularly given the assumed low density of steelhead in Panther Creek following the habitat degradation caused by the Blackbird Mine in the 1950s. However, a single genetic sample from this population showed no similarity to hatchery samples and was geographically consistent.

The factors described above lead to a moderate cumulative diversity risk, which is sufficiently low for the population to reach its desired status of viable.

Summary: The Panther Creek steelhead population is currently at high risk due to a high risk rating for spatial structure risk. Spawning surveys will be necessary to confirm whether steelhead are currently spawning in upper Panther Creek, which would reduce the population's spatial structure risk to low. A population-specific monitoring program is also necessary to reduce the uncertainty of the tentative

moderate risk rating for abundance/productivity. Table 5.3-21 shows the population's current and desired status in terms of cumulative abundance/productivity and spatial structure/diversity risks. A complete version of the ICTRT's draft status assessment for Snake River Basin steelhead populations is available upon request from NMFS.

Table 5.3-21. Panther Creek steelhead population risk ratings integrated across the four viable salmonid population (VSP) metrics. The population does not meet population-level viability criteria.

		Spatial Structure/Diversity Risk			
		Very Low	Low	Moderate	High
Abundance/ Productivity Risk	Very Low ($<1\%$)	HV	HV	V	M
	Low (1-5%)	V	V	V	M
	Moderate (6 – 25%)	M	M	M	HR Panther Creek
	High ($>25\%$)	HR	HR	HR	HR

Viability Key: HV – Highly Viable, V – Viable, M – Maintained, and HR – High Risk; shaded cells – do not meet viability criteria, with darkest cells signifying the highest risk of extinction. Percentages refer to risk of extinction over 100 years. Arrow points to desired risk status.

Limiting Factors and Threats Specific to Population

This section describes the limiting factors and threats that are specific for the population. The population is also affected by limiting factors and threats in the mainstem Columbia/Snake River corridor, estuary, and plume, and by climate change. Section 5.1.1 summarizes regional-level factors that affect all Idaho Snake River steelhead populations.

Natal Habitat

Habitat Conditions: The Panther Creek steelhead population includes the Salmon River and its tributaries upstream from the confluence of Chamberlain Creek (excluding the Middle Fork Salmon River watershed) to the confluence with Panther Creek. Major watersheds within the population include Panther Creek, Horse Creek, and Owl Creek. The geographic area encompassed within this population has a drainage area of approximately 993 square miles (2,572 km²). The region is generally characterized by cold winters and warm dry summers. The majority of the annual precipitation occurs in the late fall and early spring with most precipitation occurring as snow with infrequent thunderstorms in the summer months. Stream flow peaks during the spring months from snow melt. Of the 1,059 km of stream within the population, approximately 710 km are accessible to fish.

There is only one major spawning area (Upper Panther Creek) designated for this population and three minor spawning areas (Lower Panther, Horse Creek, and Owl Creek). The primary human impact on the Panther Creek steelhead population has been past mining activity (NPCC, p. 2-142).

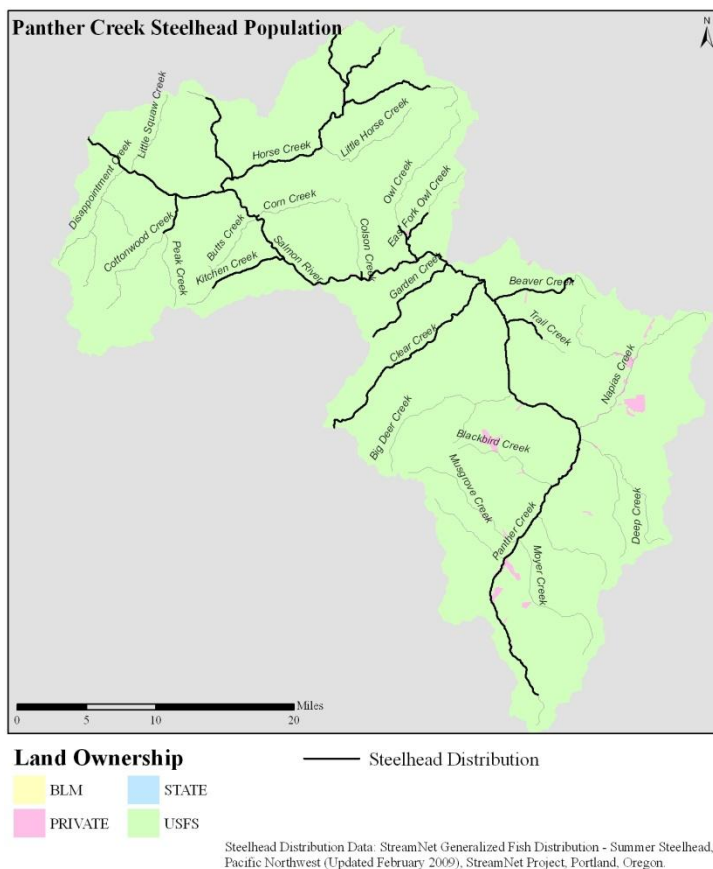


Figure 5.3-19. Land ownership within the Panther Creek steelhead population.

Land ownership within the Panther Creek population is primarily USFS (99.2%), with private at less than one percent (0.8%) (Figure 5.3-19). Small pockets of private ownership are concentrated in the drainages of Napias, Blackbird, and upper Panther Creeks. Land use in this population has included mining, logging, road construction, grazing, and recreation. The predominant activity affecting steelhead has been mining.

Panther Creek historically supported large runs of Chinook and steelhead, but these runs gradually declined during the 1940s when extensive mining activities began near Blackbird Creek. Stream habitat in Panther Creek was severely degraded by acid and heavy metal drainage from the Blackbird Mine, which operated from 1949-1967. Acid mine drainage resulted in elevated concentrations of copper in Panther Creek downstream from the mine, which eliminated most aquatic life by the early 1960s. However, extensive mine site reclamation activities over the past 15 years have partially restored water quality in Panther Creek and its

tributaries, such that salmonid habitat is improving. Chinook redds have been documented in mainstem Panther Creek starting in 2004 (IDFG 2007). No population-specific information is available on steelhead spawning, but steelhead may also be spawning in Panther Creek.

The largest tributary in the Upper Panther major spawning area is Napias Creek. Napias Falls, a natural cascade starting one mile upstream from the mouth, may be a migration barrier to steelhead. Napias Creek above the falls is not designated critical habitat for either steelhead or Chinook salmon. NMFS once concluded that Chinook could pass the current configuration of the falls at river flows of about 50 cubic feet per second (cfs) (63 FR 4615, 1/30/98) and later at FR 64 CFR 57402 determined it likely constitutes a naturally impassable barrier for Chinook. Monthly mean discharge in upper Napias Creek, upstream from multiple tributaries which contribute additional flow, was 109 cfs in May and 99 cfs in June between 1992 and 2010 (USGS 2011), making it, at the very least, an important source of flow for Upper Panther Creek. Therefore, the Napias Creek watershed will be included in the description of habitat limiting factors and threats.

The IDEQ's Integrated (303(d)/305(b)) Report identifies stream segments that are not fully supporting their assessed beneficial uses. These impaired stream segments are listed in the report under section 5 (impaired waters that need a TMDL), section 4c (waters impaired by non-pollutants), and section 4a (impaired waters than have an EPA-approved TMDL) (IDEQ 2009) (Table 5.3-22).

Table 5.3-22. Stream segments identified in the Panther Creek steelhead population from Sections 4a, 4c, and 5 of the IDEQ 2008 303(d)/305(b) integrated report (IDEQ 2009).

Waterbody	Impairment/Cause	Stream Miles
Section 5-Impaired Waters Needing a TMDL		
Big Deer Creek - South Fork Big Deer Creek to mouth	Copper	2.98
South Fork Big Deer Creek - Bucktail Creek to mouth	Copper	0.52
Panther Creek - Napias Creek to Big Deer Creek	Copper	6.08
Panther Creek - Blackbird Creek to Napias Creek	Copper	6.97
Panther Creek - Blackbird Creek to Napias Creek	Copper, Cause Unknown	5.5
Trail Creek - source to mouth	Combined Biota/Habitat Bioassessments*	9.49
Section 4c-Waters Impaired by Non-pollutants		
None		0.0
Section 4a-Impaired Waters with EPA-Approved TMDLs		
None		0.0

*The Combined Biota/Habitat Bioassessment cause is assigned to a waterbody when bioassessment scores indicate poor habitat and/or aquatic community conditions and there is insufficient information to determine the cause(s) of the poor bioassessment scores. For example, a review of the benthic organisms present in a water body may indicate there is a water quality problem; however, the cause of the problem may not be apparent from the available data.

Current Habitat Limiting Factors: NMFS determined the habitat limiting factors by reviewing multiple data sources and reports on stream conditions. Based on reports and discussions with local fisheries experts and watershed groups, NMFS concluded that the habitat limiting factors for the Panther Creek population are chemical pollutants, sediment, temperature, riparian conditions, surface water diversions, and migration barriers. Table 5.3-23 summarizes the mechanisms by which each limiting factor affects steelhead, and the management objectives for addressing each limiting factor. The following section discusses each of the limiting factors, using information from USFS reports, IDEQ reports, and the Salmon Subbasin Assessment and Management Plan (USFS 2005; USFS 2008; IDEQ 2001; NPCC2004; Ecovista 2004).

Table 5.3-23. Primary limiting factors identified for the Panther Creek steelhead population, mechanisms by which each limiting factor affects salmonids, and management objectives for addressing each limiting factor.

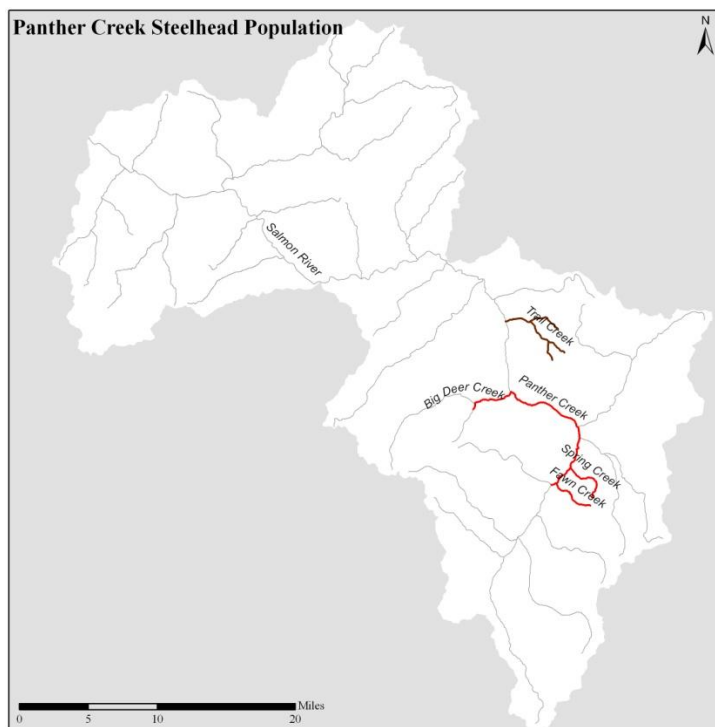
Limiting Factors	Effects on Salmonids	Management Objectives to Address Limiting Factors
Water Quality (Metals)	Pollutants can affect salmonid growth, development, and survival and can have both lethal and sublethal affects.	Improve degraded water quality and maintain unimpaired water quality.
Sediment	Excess sediments can reduce juvenile habitat (rearing), aquatic insect availability (food), and spawning and incubation success (reproduction).	Restore riparian condition and control sources of sediment.
Temperature	High stream temperatures affect salmonid growth and development, alter life history patterns, induce disease, or exacerbate competitive predator-prey interactions. High stream temperature can also be	Improve degraded water quality and maintain unimpaired water quality. Restore riparian condition.

	lethal to both adult and juvenile salmon.	
Riparian Condition	Poor riparian conditions reduce habitat quality, streambank stability (sediment and channel condition), shade (stream temperature), and large woody debris recruitment (habitat complexity and pool formation).	Restore riparian habitat condition to increase habitat complexity and large woody debris recruitment.
Stream Flow, Entrainment	Low stream flows reduce available habitat, can exacerbate high stream temperature conditions, and in extreme conditions can create barriers to migrations or movement (dry stream channels). Juvenile fish entrainment occurs through unscreened irrigation diversions. Young salmon are at risk when they are diverted into canals or diversion ditches.	Increase instream flow, and screen irrigation diversion structures.

1. Degraded Water Quality (Metals).

Abundance and productivity of this population have been reduced by historic mine-related chemical contamination of surface water. The current spatial structure of this population has also been shaped by poor water quality conditions related to mining; steelhead in Panther Creek were likely extirpated in the 1950s due to chemical contamination (ICTRT 2008), but may now be reestablishing as water quality improves.

Sections of Panther Creek, Big Deer Creek, and South Fork Big Deer Creek are impaired due to copper contamination, totaling about 16 stream miles, shown in Figure 5.3-20 (IDEQ 2009). As reported by



303(d) List

— Copper

— Does not support beneficial use - cause unknown

Data: Idaho Department of Environmental Quality. Idaho 2008 305(b) 303(d) Integrated Report (Final).

Figure 5.3-20. Impaired stream reaches in the Panther Creek Steelhead population (IDEQ 2009).

IDEQ (2001), cobalt and copper were mined and milled at the site from 1917 to 1967. The main period of extraction followed World War II, from 1949 to 1967. No commercial mining has occurred at Blackbird Mine since 1967. Because of the nature of the rock ore being mined, cobalt, arsenic, copper, iron, and acid drainage were water quality concerns (Mebane 1994, as cited in IDEQ 2001). Since the initiation of clean-up efforts at Blackbird Mine in the 1990s, substantial progress has been made in reducing acid and heavy metal contamination in Panther Creek streams and meeting required water quality standards. Salmonids are now beginning to reoccupy lower Blackbird Creek and Big Deer Creek downstream of the South Fork of Big Deer Creek (USFS 2008). Although fish populations have increased along main Panther Creek, populations still appear to be depressed (USFS 2008). Despite extensive mine reclamation efforts, contaminated soils and tailings piles still have the potential to deliver copper and other metals to streams during high streamflow events.

2. *Excess Sediment.*

Currently, none of the streams within the Panther Creek population are reported to be impaired as a result of sediment. However, reported watershed conditions and sediment levels suggest elevated sediment may be affecting abundance and productivity of the Panther Creek steelhead population.

The amount of disturbed area in a watershed is often used as an indicator of the potential adverse effects to aquatic resources. The USFS (2005) used percent disturbance (from clear cut logging, fire, or mining) and road density within watersheds to assess watershed condition in Panther Creek. In the upper Panther Creek watershed the overall watershed condition was considered low risk (USFS 2005), suggesting a low risk for sediment delivery to streams. In the middle Panther Creek watershed the overall watershed condition was rated as high risk. Total disturbance area for the watershed was 35.5 percent, with most of the disturbance created by fire (31% of the watershed). High road densities in Blackbird, Deep, and the Copper Creek subwatersheds also contribute to the high risk rating. Panther Creek, Copper Creek, and Blackbird Creek roads encroach on their respective streams for most of their length. In the Napias Creek watershed the overall watershed condition was rated as moderately high. Fire was the largest contributor to disturbance area (16% of the watershed) in the Arnett Creek subwatershed, which also has high road densities. In lower Panther Creek the overall watershed condition was rated as high risk, with 50 percent of the watershed classified as disturbed. Total disturbed area was dominated by fire (49% of the watershed) but road densities were low. The high levels of ground disturbance in Middle Panther Creek, Napias Creek, and Lower Panther Creek suggest that sediment delivery to streams may be high in these watersheds.

To directly assess sediment conditions in Panther Creek, the USFS (2005) used sediment core samples of stream substrate to determine the suitability of the substrate for fish. The Forest Plan standard for sediment levels in resident fish streams is less than 28.7 percent fine sediment and the standard in anadromous fish streams is less than 20 percent fine sediment. Sediment sampling reported for many streams in the Panther Creek drainage often exceeded standards for fine sediments (USFS 2005). In the upper Panther Creek watershed, upstream from the confluence of Moyer Creek, sediment monitoring from 1993 to 2004 showed that 33 percent (23 of 70) of the samples collected exceeded sediment standards. However, no stream consistently had sediment levels above standards, and no samples collected after 1996 were considered “functioning at unacceptable risk.” In the middle Panther Creek watershed, 39 percent (14 of 36) of the samples collected exceeded sediment standards. Deep and Woodtick Creeks met the sediment standard in most years. Big Deer Creek and Little Deep Creek did not meet standards in most years. In the Napias Creek watershed, 47 percent (34 of 73) of samples collected exceeded sediment standards. Napias Creek below Jefferson Creek was the only station of six stations evaluated that consistently met standards. At the mouth of Arnett Creek, there were no samples above the standards. In the lower Panther Creek watershed (downstream from Big Deer Creek), 63 percent (34 of 54) of the samples collected exceeded sediment standards. Sediment samples collected in lower Panther Creek and Clear Creek exceeded standards but the high sediment levels were likely in response to the Clear Creek wildfire in 2000. Sediment cores from sample sites throughout the Panther Creek thus suggest that sediment is elevated in middle Panther Creek, Napias Creek, and lower Panther Creek, matching the conclusions from the watershed disturbance assessment.

Logging occurred in the Owl Creek drainage from the early 1930s up to the late 1980s. In 1985, a large fire burned 27,000 acres in Owl Creek, increasing sediment loads to the streams; however, sediment sampling in 1999 shows that the upper reaches of the creek are improving (IDEQ 2001).

Warren and Anderson (2010) observed excellent instream habitat conditions and good riparian habitat conditions, indicating the stream was recovering well from the fire.

Given the watershed and sediment conditions described, sediment is likely to affect abundance and productivity of steelhead in the middle Panther Creek, Napias Creek, and lower Panther Creek watersheds. Sediment in the upper Panther Creek watershed and Owl Creek watershed does not appear to be a limiting factor for steelhead.

3. Elevated Water Temperature.

Stream temperatures (7-day running maximum temperatures) recorded in the Panther Creek watershed from 1993 to 2004 sometimes exceeded PACFISH standards (USFS 2005), suggesting possible temperature impacts to steelhead. USFS (2005) reported the following temperature conditions in the Panther Creek drainage. In the upper Panther Creek watershed, stream temperatures were mostly within standards except for the Panther Creek mainstem and the mouths of Musgrove and Moyer Creeks, which had temperatures above standards for anadromous fish. In the middle Panther Creek watershed, stream temperature met standards in most years in Woodtick, Deep, Little Deep, and Big Deer Creeks and at one station on Panther Creek above Big Jureano Creek. Stream temperatures did not meet standards in Blackbird Creek at the mouth and in most years on Panther Creek at two stations, one above Napias Creek and the other above Deep Creek. In the Napias Creek watershed, stream temperature met standards in Moccasin and Arnett Creeks and in Napias Creek above Sharkey Creek. Stream temperature did not meet standards in Napias Creek just above Arnett Creek and from Phelan Creek to Moccasin Creek. At the mouth of Napias Creek stream temperature met standards in more than half of the years examined. Lower Napias Creek below Napias Falls tends to cool down as compared to the headwater reaches. Steelhead habitat in Napias Creek below Napias Falls is “functioning appropriately” in terms of temperature regime (USFS 2005). In the lower Panther Creek watershed, Panther Creek at the mouth did not meet standards in all years. It is likely that many stream reaches in the lower Panther Creek watershed similarly exceed temperature standards (USFS 2005), due in part to recent wildfire. Although Clear Creek, the major tributary in lower Panther Creek, met temperature standards in the 1990s, canopy cover was completely removed over the lower 7 miles of Clear Creek during the Clear Creek Fire of 2000.

Stream temperature is likely affecting abundance and productivity of steelhead. Sporadic exceedances of temperature standards in the Upper Panther Creek watershed may merely reflect the range of natural conditions. More consistent temperature exceedances in the middle and lower reaches of Panther Creek, Napias Creek, Blackbird Creek, and Clear Creek may be linked to wildfire and to land use activities that have reduced riparian function. Fire can increase stream temperatures through the removal of riparian vegetation, leading to decreased shade and to unstable streambanks, which in turn can lead to increases in channel width. Lack of shade and wider stream channels allow more sun directly on the stream. Temperature impacts to Clear Creek are likely the result of fire-related conditions. These conditions are likely to improve over time with natural revegetation of hill slopes and riparian areas. Temperature impacts to other stream reaches in Panther Creek may be the result of human land uses, such as mining, grazing, and road-building, which have removed riparian vegetation.

4. Degraded Riparian Conditions.

Degraded riparian conditions in the middle Panther Creek, Napias Creek, and lower Panther Creek watersheds may be reducing population abundance and productivity through changes in habitat quality.

The USFS (2005) described riparian conditions throughout the Panther Creek drainage. In the middle Panther Creek watershed, loss of functionality of riparian areas is related to historic mining, roads, and some grazing. Riparian areas along Panther Creek and Blackbird Creek have been adversely affected by roads and mining activities. On rare occasions, cattle graze along mainstem Panther Creek, but most of the grazing along perennial fish-bearing streams occurs along upper Deep Creek, Little Deep Creek, and upper Copper Creek. Grazing has adversely affected short segments of upper Spring Creek and Copper Creek.

Loss of large riparian trees has also affected stream complexity and stability. Large woody debris and pool frequency and quality do not meet desirable conditions in most reaches surveyed. Because of road encroachment and lack of large woody debris along main Panther Creek, pools are lacking. In general, streambank stability meets PACFISH standards, except for Blackbird Creek where streambanks are extremely unstable following years of mining and mine clean-up activities. Recent projects to stabilize these streambanks may mitigate this into the future. Most of the riparian areas along Blackbird Creek lack deep-rooted riparian vegetation species that hold streambanks together. In the Napias Creek watershed, loss of functionality of riparian areas is related to historic mining and grazing. Many stream reaches along Arnett, Napias, Phelan, Sharkey, and Rabbit Creeks have been placer or dredge-mined (USFS 2005). Riparian conditions along some of these reaches have recovered, whereas continued cattle grazing has retarded recovery in other areas. Additionally, livestock grazing has affected riparian functionality along several reaches where historic mining never occurred such as upper Sawpit Meadows, Cat Creek, and Moccasin Creek. Overall, habitat elements such as large woody debris, pool frequency and quality, and streambank stability are below standards, and suggest poor riparian conditions.

In lower Panther Creek, there are no active grazing allotments along perennial streams. Riparian condition and function is improving as deciduous vegetation is recovering rapidly along most streams that were burned in the Clear Creek wildfire of 2000. Large woody debris before the Clear Creek fire was deficient in most areas, but USFS (2005) estimates that LWD is increasing following the fire. Pool frequency and quality are below desirable conditions in 8 of 12 surveyed reaches in 1991. After the fire, riparian conditions in Lower Panther Creek below Beaver Creek, and in Clear Creek and Garden Creek, were severely degraded by the 2002 and 2003 thunderstorms and subsequent debris torrent. Most pool forming features such as boulders and LWD were moved above the high water mark or completely transported out of the system. However, USFS (2005) estimates that once fire-killed trees are recruited to stream channels, LWD will again play an active role in the formation of pools. Streambank stability along main Panther Creek met PACFISH standards in 1991, except for a couple of low gradient reaches just above the mouth of Clear Creek. After the thunderstorms and subsequent debris torrents, bank stability along lower Panther Creek below Beaver Creek, lower Clear Creek below Rancherio Creek, and Garden Creek was substantially reduced.

5. Migration Barriers.

Migration barriers have affected the abundance, productivity, and spatial structure of the Panther Creek population. Several natural and man-made migration barriers exist in the Panther Creek steelhead population. For many years water chemical contamination and acid drainage from Blackbird Creek and Big Deer Creek, from the Blackbird Mine, essentially blocked steelhead migration up and down Panther Creek. Observations of Chinook spawning in Panther Creek in recent years suggest that water quality has improved (USFS 2008). It is reasonable to assume that water quality conditions that allow

Chinook salmon to migrate, spawn, and rear in Panther Creek also allow steelhead migration and recolonization.

In the Blackbird Creek watershed, the lower quarter-mile of West Fork Blackbird Creek has been placed into an artificial concrete channel across the tailings impoundment (USFS 2008). At the lower end, the concrete channel plunges approximately 60-70 feet. This channel is both an upstream and downstream barrier to all fish species. Sections of main Blackbird Creek downstream of Meadow Creek have also been placed in a concrete channel to prevent leaching. There is a small dam and reservoir located along Blackbird Creek just upstream from Meadow Creek. Although both of these man-made features are upstream barriers to fish passage, the barriers were created as part of remedial actions for historic mine impacts and are likely permanent.

Other barriers known to occur in the Panther Creek occur in the Napias Creek and Woodtick Creek watersheds. The only known man-caused barrier in the Napias Creek watershed is the headgate associated with the Phelan Creek five ditch (USFS 2008). Natural barriers occur at Devlin Falls along upper Napias Creek and at a talus slope along lower Moccasin Creek. Napias Falls, a natural cascade starting one mile upstream from the mouth, may be a migration barrier to steelhead at some streamflows. There is also a natural cascade located in lower Big Deer Creek that blocks migration of bull trout, steelhead trout, and Chinook salmon (Kuzis 2004, USFS 2008). In Woodtick Creek, one culvert has been identified as a fish barrier.

Although not likely a barrier to upstream migration, an unscreened water diversion in the lower segment of Owl Creek presents a possible entrainment hazard to fish migrating downstream (Warren and Anderson 2010).

6. Reduced Streamflow during Critical Periods.

Streamflow reductions in this population could affect steelhead abundance and productivity, but impacts to spatial structure are negligible. Surface water withdrawals are scattered throughout the basin for irrigation and for mining purposes. USFS (2005) lists 138 water rights within the Panther Creek drainage totaling an estimated 46 cfs. The Idaho Department of Water Resources (IDWR) water rights database shows 75 water rights with maximum diversion rates greater than 0.02 cfs, distributed across 103 points of diversion, with a combined maximum diversion rate of 125.94 cfs (IDWR 2009). Reductions in streamflow, particularly in tributaries, may be reducing the amount of available habitat for salmonids.

Summary of Current Habitat Limiting Factors

Freshwater habitat in the Panther Creek steelhead population has been degraded from its historical condition. Mining, grazing, logging, and roads have affected freshwater habitat quality (USFS 2005; IDEQ 2001). The historic impacts of chemical contamination from the Blackbird Mine essentially eliminated steelhead runs in Panther Creek (USFS 2005; USFS 2008), but water quality is now improving to the point where the reestablishment of salmon and steelhead populations in the drainage may be possible. Nonetheless, land use activities have reduced water quality, increased sedimentation and stream temperatures, reduced connectivity and adversely affected riparian condition and function. Each of these factors may act cumulatively or independently to adversely affect steelhead.

Potential Habitat Limiting Factors and Threats: Several potential concerns have not yet risen to the level of limiting factors, but needs to be managed to protect steelhead habitat in the Panther Creek population area.

1. Degraded water quality due to new mineral exploration and development — The Salmon-Challis National Forest has approved a Mining Plan of Operations submitted by Formation Capital Corporation (FCC). FCC's mining plan, called the Idaho Cobalt Project, includes the development of an underground mine, a waste disposal site, and associated facilities on USFS lands near the Blackbird Mine site. The mine plans have successfully undergone ESA section 7 consultation for steelhead and Chinook salmon (NMFS 2008). NMFS determined that the proposed mining project is not likely to jeopardize the continued existence of the species, in part due to several conservation measures included in the mine proposal: all effluent from the proposed mine will be treated before entering streams, water quality downstream from the mine will be monitored for heavy metals, and fish tissue will also be monitored for potential bioaccumulation of metals. Nonetheless, large-scale mining operations like the proposed Idaho Cobalt Project pose a threat to salmonid habitat if water quality treatment measures are not successful.
2. Degraded habitat from noxious weeds — The spread of noxious weeds can increase soil erosion and decrease native plant density.
3. Degraded habitat functions and water quality due to wildfire — Severe wildfires can increase sediment delivery to streams, stream temperatures, and the vulnerability of streams to other disturbances. Additional disturbances in watersheds affected by the Clear Creek wildfire of 2000 should be avoided.

Hatchery Programs

[To be developed]

Harvest Management

[To be developed]

Recovery Strategies and Actions

The recovery strategies that address a limiting factor may include both short-term and long-term actions. Short-term actions are projects scheduled to be implemented within the next ten years by a resource management agency or local stakeholder group. Long-term actions are categories of actions that could increase productivity for the population, but for which a specific project has not yet been proposed by a resource management agency or other stakeholder.

Natal Habitat Recovery Strategy and Actions

Priority stream reaches: Priority stream reaches for habitat actions in this population are those with high intrinsic potential in: (1) The upper Panther major spawning area, and (2) the lower Panther minor spawning area. Within the upper Panther major spawning area, the Napias Creek drainage is of lower priority since the falls on lower Napias Creek may be a barrier to steelhead migration. However, this drainage does have suitable habitat for steelhead spawning and rearing.

The Upper Salmon Basin Technical Team prioritized stream reaches in the Salmon River upstream from the Middle Fork confluence in a report titled Screening and Habitat Priorization for the Upper Salmon Subbasin (SHIPUSS) (USBWP 2005). The SHIPUSS report prioritized reaches based on a scoring system that considered stream connectivity, stream size, and habitat and fisheries information on a weighted basis. Under SHIPUSS, Priority I streams are those streams that have the potential to realize immediate, tangible benefits to fish if recovery efforts are directed toward them. The SHIPUSS report ranks all stream reaches in the Panther Creek drainage as Priority I, indicating a large potential for habitat actions to benefit the Panther Creek steelhead population.

For this population to recover, water quality must be suitable for adult spawning, juvenile rearing, and adult and juvenile migration. Chemical contamination from Blackbird and Big Deer Creeks could hinder the population's recovery. EPA is the lead agency for dealing with mine-related issues, and CERCLA-related remedial actions for the Blackbird Mine will continue to occur under EPA's direction, separate from this recovery plan.

Habitat actions: The following habitat actions, ranked by priority, are intended to improve productivity rates and increase the effective capacity for natural smolt production in the watershed, and to contribute to maintaining and restoring the VSP parameters while moving the population toward its desired status of viable. Based on recent assessments of Panther Creek stream conditions (IDEQ 2001, USFS 2005, USFS 2008), the quality of fish habitat could be improved by reducing the effects of mining, grazing, and roads. The habitat problems identified by these reports were water quality, sediment, temperature, migration barriers, and riparian condition. Many of the habitat issues identified for the Panther Creek population can be addressed by restoring riparian function and water quality.

1. Restore water quality in Blackbird Creek, Big Deer Creek, and Panther Creek so that steelhead migration, spawning, and rearing are no longer affected by chemical contamination of surface water or by unstable sediments from historic mining. This is the first priority for Panther Creek. However, EPA will continue to administer CERCLA-related remedial actions for the Blackbird Mine area, separate from this recovery plan.
2. Address sediment, temperature, and poor riparian conditions that degrade current and potential spawning and rearing habitat for steelhead. Improving riparian habitat conditions will lead to improvement in instream sediment and temperature conditions. Riparian habitats have been affected by historic mining (Napias and Blackbird Creeks), roads along streams, and livestock grazing. Reducing road densities where feasible and continued road maintenance will reduce potential sediment sources. Managing livestock grazing allotments so that riparian vegetation is near potential natural vegetation will benefit sediment and temperature conditions.
3. Evaluate and upgrade existing irrigation diversions to ensure that diversions bypass adequate instream flow, provide for fish passage, and are adequately screened.
4. Eliminate fish migration barriers within the population that are blocking access to potential steelhead habitat.

Implementation of Habitat Actions

Implementation of habitat actions for this population will likely occur through the work of USFS, IDFG, IDEQ, the soil and water conservation district, the Upper Salmon Basin Watershed Project, and the Shoshone-Bannock Tribes. The USFS manages 99 percent of the land in this population area.

EPA will continue to administer CERCLA-related remedial actions for the Blackbird Mine, separate from this recovery plan. No short-term habitat projects are currently proposed for the Panther Creek steelhead population.

Many habitat restoration projects have already been completed in the Panther Creek watershed. NPCC (2004) reported that 56 projects had been completed to improve fish and wildlife habitat in the Middle Salmon-Panther watershed (Table 5.3-24). These projects included placement of instream structures and fish passage improvements, as well as riparian fencing, road and trail work, and modifications to surface water diversions. An estimated 10 miles of stream habitat have been fenced to improve or maintain riparian habitat conditions, seven miles of stream have had significant alterations made to grazing practices to reduce impacts to riparian vegetation, and 19.5 miles of road or trail have been altered to reduce sediment impacts and protect wildlife. The Panther Creek drainage is also undergoing a substantial cleanup effort designed to reduce the legacy of mining-related impacts.

Table 5.3-24. Partial list of habitat actions that have occurred to improve aquatic habitat in the Panther Creek steelhead population (NPCC 2004).

Year	Habitat Actions
1989	Owl Creek fish passage improved with removal of three migration barriers.
1991	Colson Creek, Ebenezer Creek, and Long Tom Creek fish passage was improved with correction of six culverts.
	Instream cover habitat improvement on lower Moyer Creek (boulder placement), fish passage correction at a culvert and a tributary to Moyer Creek was fenced to protect riparian vegetation and streambank stability.
1997	Past habitat improvements include culvert rehabilitation to improve fish passage and the planting of native riparian species along the stream banks. Riparian plantings in Deep Creek were completed in 1997 to replace lost vegetation, stabilize erosive banks, and restore thermal insulation in the stream.
1989-1996	As part of the stream habitat improvement efforts in the Napias Creek watershed, riparian fencing was installed in 1996 to enhance bank stability along Moccasin Creek. Other improvement efforts in the Napias Creek Watershed include several riparian/wetland exclosures that were built along Napias Creek as part of the wetland mitigation for the Beartrack mine. Additional improvements also include beaver planting along Arnett Creek in 1989, installation of culverts on logging roads in 1992, and development of a stream habitat reclamation plan in 1992.
	Rehabilitation efforts include placing boulders in the stream in the lower end of the watershed to improve instream cover and bank stability.
2001	Four impassible culverts replaced with fish friendly culverts: Porphyry Creek (FS Road # 112), Cabin Creek (FS Road # 055), Opal Creek (Forest Road #055), and Otter Creek (Forest Road #055).

Habitat Cost Estimate for Recovery

Since no short-term habitat projects are currently proposed for the Panther Creek steelhead population, there are no short-term habitat costs associated with this population.

Hatchery Recovery Strategy and Actions

[to be added]

Harvest Recovery Strategy and Actions

[to be added]

5.3.6.6 Lemhi River Steelhead Population

Abstract/Overview

The Lemhi River steelhead population is currently rated as maintained, with moderate abundance/productivity and diversity risk. The surrogate A-run population used to estimate the population's current status is currently rated at moderate risk. The population is targeted to achieve a desired status of Viable, which requires low abundance/productivity risk. The spatial structure and diversity ratings are sufficient for the population to reach its desired status.

Current Status	Desired Status
Maintained	Viable

The actions identified in this recovery plan to occur over the next 10 years are unlikely to achieve this population's desired status, so additional actions will need to be taken in the spawning and rearing habitat, the migration corridor and the estuary. Opportunities for improving survival beyond the short-term actions identified in this recovery plan will occur primarily in the mainstem river migration corridor. Some of these additional recovery actions may be identified and implemented in the near term. However, the major opportunity for identifying additional actions to increase survival will occur after the analysis of the information being collected during the ten-year term of the 2008 FCRPS Opinion, the U.S. v. Oregon Agreement, and the Pacific Salmon Treaty. The monitoring and research information collected during this ten-year period, particularly in the mainstem rivers, will provide an important opportunity to re-evaluate the status of the species and will provide additional knowledge that will guide the next round of actions under this recovery plan.

Currently, there is a high degree of uncertainty in estimating the nature and timing of a population's response to various recovery strategies, determining the gap between the current status and the desired status, and determining the amount of improvement necessary to achieve the viability target for this population. Due to this uncertainty, it is important to implement an adaptive management strategy, in conjunction with the ESA's five-year status reviews and the actions described in the Research, Monitoring, and Evaluation chapter. If the initial actions do not produce the intended response, the actions will be adjusted to produce the additional needed improvement.

Introduction

This section of the recovery plan compares the population's desired status to its current status, and describes how the population fits into the recovery strategy for the MPG and DPS. The primary sources of information are the ICTRT viability criteria (NMFS 2007b) and the ICTRT's Snake River steelhead status assessment (ICTRT 2008).

Population Status

The Population Status section describes the population's current status as defined in the ICTRT's most current status assessment (ICTRT 2008) where they discussed risk in terms of four viability parameters: Abundance, Productivity, Spatial Structure and Diversity. Other available information was also considered. The section focuses primarily on population Abundance (the total number of adults) and Productivity (the ratio of returning adults to the parental spawning adults). It compares the population's current status to the desired status in terms of both abundance and productivity. It also summarizes Spatial Structure (the amount and nature of available habitat) and Diversity (genetic traits)

concerns identified by the ICTRT. Diversity concerns are also discussed in the hatchery section. More details are available in the Snake River steelhead status assessment (ICTRT 2008).

Population Description: The ICTRT (2003) distinguished Lemhi River steelhead as an independent population based on geographic isolation from other populations. In addition, the Lemhi River flows primarily through a dry intermontane sagebrush valley, which is a markedly different habitat type than other watersheds within the Salmon River basin, with the exception of the Pahsimeroi River. The population includes both the Lemhi River basin and the Salmon River and its tributaries from the Lemhi River downstream to the North Fork Salmon River (Figure 2.3-21). The Lemhi River population is an A-run steelhead population.

Current steelhead distribution is limited to the Lemhi River mainstem and its tributaries Hayden, Big Springs, and Bohannon Creeks. Most other tributaries have until recently been seasonally or permanently disconnected from the Lemhi River by irrigation diversion structures or low flows from water withdrawals, precluding access to anadromous fish. The recent stream reconnection projects, completed from 2007 through 2010, of Big Timber, Eighteenmile, Hawley, Canyon, and Kenney Creeks should allow steelhead to reestablish in these tributaries. A NMFS model of potential habitat for the Interior Columbia Basin, based on geomorphological characteristics, suggests that these tributaries could support steelhead spawning and rearing if they were reconnected (NMFS 2006).

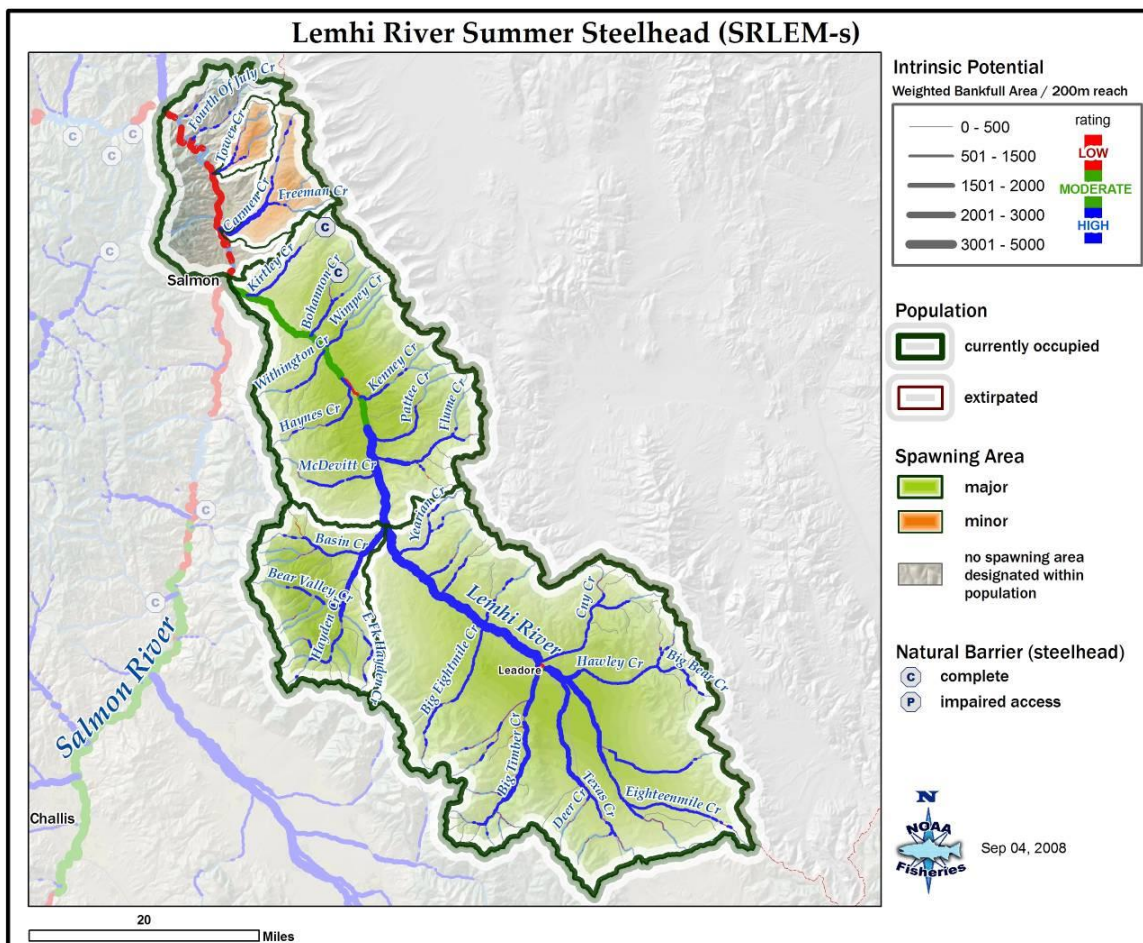


Figure 5.3-21. Lemhi River steelhead population, with major and minor spawning areas.

The ICTRT classified the Lemhi River population as “intermediate” in size and complexity based on historical habitat potential (ICTRT 2007). A steelhead population classified as intermediate has a mean minimum abundance threshold of 1,000 natural-origin spawners with sufficient intrinsic productivity (≥ 1.14 recruits per spawner at the abundance threshold) to achieve a 5 percent or less risk (“low risk”) of extinction over a 100-year timeframe.

Abundance and Productivity: Most Snake River steelhead populations (including all of the Idaho populations) do not have direct estimates of annual spawning escapements. The ICTRT generated preliminary estimates of average population abundance and productivity for these Snake River populations using annual counts of wild steelhead passing Lower Granite Dam. Estimates were developed for two average surrogate populations to represent both major run types (A and B). These abundance and productivity estimates were then compared to a viability curve for an intermediate-sized Snake River steelhead population (requiring a minimum abundance threshold of 1,000 natural-origin spawners and a productivity of 1.14 recruits per spawner).

The ICTRT used the surrogate population for A-run steelhead above Lower Granite Dam to estimate abundance/productivity of Lemhi River steelhead. The surrogate population has an estimated recent abundance of 556 and productivity of 1.86. It is rated as Moderate Risk based on current abundance and productivity, as shown in Figure 5.3-22 (25% or less risk of extinction over a 100-year timeframe). Although the current estimate of intrinsic productivity is above the minimum threshold for low risk, the current average natural abundance (recent 10-year geometric mean) is well below the ICTRT minimum threshold value of 1,000. More specific information about how the abundance and productivity estimates were calculated is included in the ICTRT’s steelhead status assessment Appendix B-1 *Calculating Representative Abundance and Productivity Estimates for Snake River A and B run Steelhead Populations*.

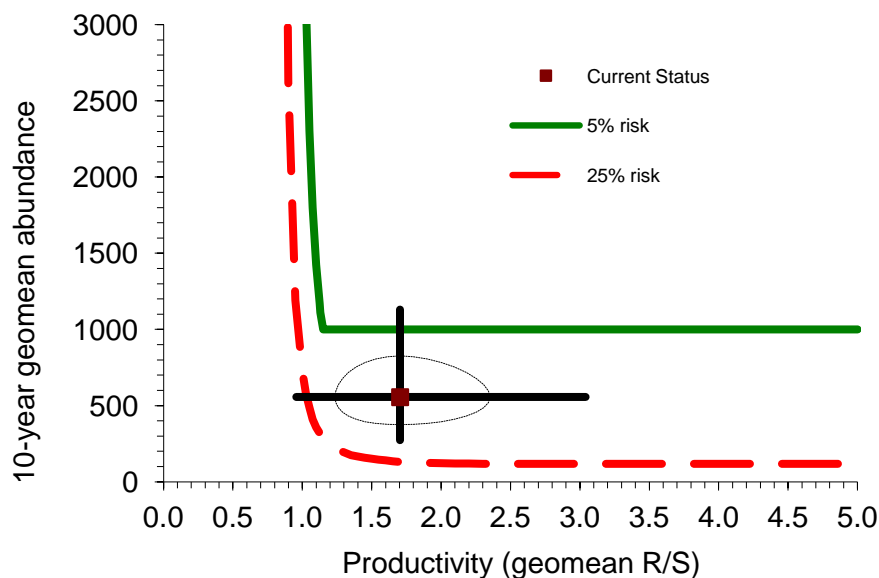


Figure 5.3-22. Snake River A-run surrogate steelhead population current estimated abundance and productivity (A/P) compared to DPS viability curve (1986-2005). Ellipse = 1 SE about the point estimate. Error bars = 90% CI for A, 98% CI for P (if point estimate >1% risk curve, the uncertainty test is <1% probability the combined A/P is at high risk).

Spatial Structure: The ICTRT identified three major spawning areas (Upper Lemhi, Lower Lemhi, and Hayden Creek) and two minor spawning areas (Carmen Creek and Tower Creek) within this population (Figure 5.3-25). Both minor spawning areas are tributaries to the main Salmon River. Based juvenile distribution data, all three major spawning areas are currently occupied, but neither of the minor spawning areas is occupied. The absence of steelhead in the minor spawning areas increases the gap between this population and the two nearest downstream populations (North Fork Salmon River and Panther Creek). However, because the major spawning areas are currently occupied and provide a large amount of potential steelhead habitat, the cumulative spatial structure risk for this population is low, which is sufficient for the population to reach its desired status of viable.

Diversity: The diversity risk for this population is driven by lack of information on genetic diversity, uncertainty in the influence of anthropogenic disturbances on phenotypic variation, and the risk associated with hatchery steelhead programs.

Phenotypic variation for this population has likely been reduced due to altered habitat conditions in the Snake and Columbia River migration corridor and in spawning and rearing habitat within the population boundaries. In the migration corridor, reduced flows and elevated water result in a narrower window for successful smolt out-migration. Adult entry into the Snake River and migration through the lower Snake River in late summer and early fall is delayed because of elevated mainstem temperatures. It is hypothesized that adult upstream migration has changed from historic conditions due to temperature effects, but the magnitude of the change is unknown. Within the population boundaries, irrigation practices result in dewatering of the lower reaches of many tributaries for a significant part of the year. The disconnection of tributaries from the mainstem Lemhi River affects juvenile movement patterns and habitat use during freshwater rearing.

Hatchery steelhead are released into this population at multiple locations for both harvest augmentation and for supplementation of the natural population. Hatchery smolts are released into the main Salmon River near the Lemhi River confluence for harvest augmentation. These fish are primarily Pahsimeroi Hatchery A-run stock, which was derived from Hells Canyon (out-of-MPG) stock. Some returning hatchery fish are not harvested in fisheries and do not recruit back to weirs or traps, and are thus assumed to be spawning naturally. The number and proportion of natural spawners in this population that are hatchery-origin is unknown.

An additional diversity concern for this population is the effect of ongoing hatchery releases directly into the Lemhi River, and the recent management practice of releasing unmarked hatchery steelhead smolts and planting eyed eggs to supplement natural production. Hatchery smolts have been released into the population starting in 1968, and eggs, fry, pre-smolts, and adults have also been released in multiple years since that time. From 2001 to 2006, between roughly 116,000 and 260,000 unmarked hatchery steelhead smolts were released into the Lemhi River each year to supplement the population. At smolt-adult-return rates of 0.1-2.0 percent, returns from the smolt releases alone would range from 120 to 5,200 adults annually, and potentially could comprise a high proportion of total spawners in the population. Eyed eggs were also planted in the population from 1996 to 2002.

The factors described above lead to a moderate cumulative diversity risk, which is adequate for the population to reach its desired status.

Summary: The Lemhi River steelhead population is currently at moderate risk due to a tentative moderate risk rating for abundance/productivity and a moderate risk rating for diversity. A population-specific monitoring program is necessary to reduce the uncertainty of this rating. Abundance and productivity will need to increase for the population to achieve its desired status of viable. A diversity risk of moderate, on the other hand, is sufficiently low for the population to reach its desired status. Table 5.3-25 shows the population's current and desired status in terms of cumulative abundance/productivity and spatial structure/diversity risks. A complete version of the ICTRT's draft status assessment for Snake River Basin steelhead populations is available upon request from NMFS.

Table 5.3-25. Lemhi River steelhead population risk ratings integrated across the four viable salmonid population (VSP) metrics. The population does not meet population-level viability criteria.

		Spatial Structure/Diversity Risk			
		Very Low	Low	Moderate	High
Abundance/ Productivity Risk	Very Low (<1%)	HV	HV	V	M
	Low (1-5%)	V	V	V	M
	Moderate (6 – 25%)	M	M	M Lemhi River	HR
	High (>25%)	HR	HR	HR	HR

Viability Key: HV – Highly Viable, V – Viable, M – Maintained, and HR – High Risk; shaded cells – do not meet viability criteria, with darkest cells signifying the highest risk of extinction. Percentages refer to risk of extinction over 100 years. Arrow points to desired risk status.

Limiting Factors and Threats Specific to Population

This section describes the limiting factors and threats that are specific for the population. The population is also affected by limiting factors and threats in the mainstem Columbia/Snake River corridor, estuary, and plume, and by climate change. Section 5.1.1 summarizes regional-level factors that affect all Idaho Snake River steelhead populations.

Natal Habitat

Habitat Conditions: The Lemhi steelhead population includes the Lemhi River subbasin and the Salmon River and its tributaries from the confluence of the Lemhi River to the confluence of the North Fork Salmon River. The population boundaries encompass 1,472 square miles (3,812 km²). The drainage is semiarid, with most of the precipitation falling as snow in the higher elevations. The climate of the basin varies with changes in elevation from 4,100 feet to 11,000 feet. Annual average precipitation ranges from 7 inches at lower, drier elevations to 23 inches at higher elevations. Most of this occurs during winter months in the form of snow and in the spring and fall as rain (IDEQ 1999).

The Lemhi River is a low gradient, spring-fed system that flows from the confluence of Texas and Eighteenmile Creeks near the town of Leadore to its confluence with the Salmon River at the town of Salmon. Peak flows generally occur in June and the lowest flows are experienced in August (IDEQ

1999). Many streams within the subbasin have become disconnected from the Lemhi River because of irrigation withdrawals (IDEQ 1999).

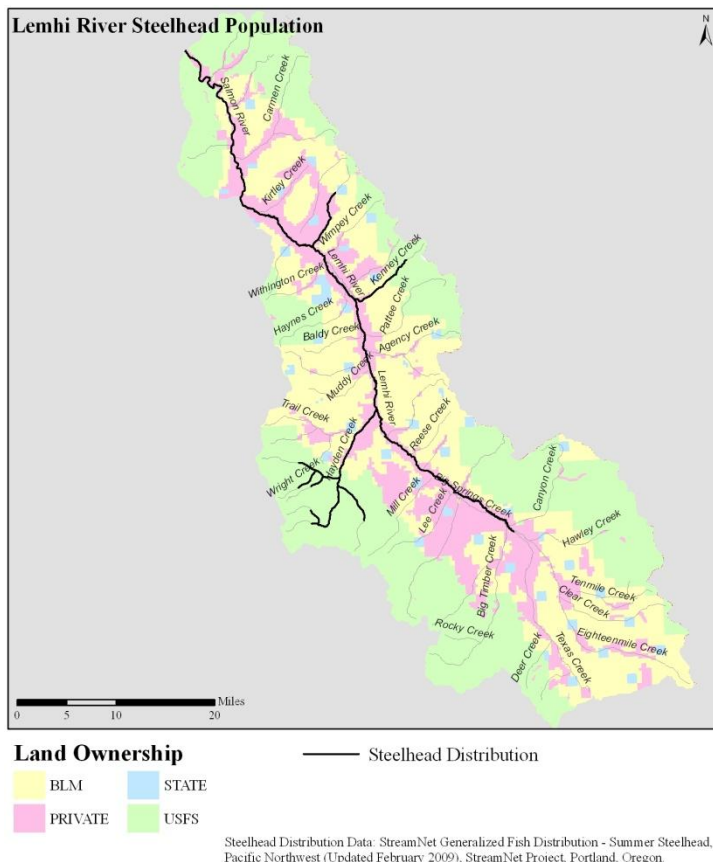


Figure 5.3-23. Land ownership pattern within the Lemhi River steelhead population.

the vegetation, structure, and connectivity of the riparian zones in the Lemhi subbasin. Altered riparian conditions exist throughout the population overlapping much of the currently occupied Chinook and steelhead habitat (NPCC 2004, p. 3-22). As reported by IDEQ (1999), the Lemhi River and nearly all of its tributaries are entirely or significantly diverted for irrigation purposes between late April and the end of October. Claims on the major tributaries for the 30 watersheds presented in the Lemhi River Watershed and Subbasin Assessment total 787.4 cfs (IDEQ 1998). Many of the tributaries only reach the river during spring runoff. These seasonal variations in water quantity can have a severe effect on fish populations and movement as well as riparian vegetation within the subbasin (IDEQ 1999). Historic mining also affected stream habitat in this population. Dredge piles along Kirtley and Bohannon Creeks show the legacy effects of past mining for gold (Loucks 2000).

IDEQ's 2008 Integrated 303(d)/305(b) Report includes stream segments listed under section 5 (303d streams), section 4c (waters impaired by non-pollutants), and section 4a (EPA approved TMDLs) (IDEQ 2009). The following table displays impaired streams segments for the Lemhi steelhead population and the impairments that prevent each stream reach from attaining its beneficial uses (Table 5.3-26). Although not all of these impaired stream reaches contain steelhead habitat or list impairments of direct concern to steelhead, the full list is included here to show the range of impairments to stream conditions within the Lemhi steelhead population.

Land ownership within the Lemhi River subbasin is mostly USFS (42%), BLM (36%), and private (19%) with a much smaller portion of ownership under the state of Idaho (3%) (Figure 5.3-23). USFS lands occupy the upper benches and higher elevation forested lands. BLM lands are generally the low to mid elevation lands. The valley bottom lands are a mix of private, BLM and state ownership surrounding much of the mainstem Lemhi River and lower tributary stretches. The public lands are used for livestock grazing, timber, recreation, and a variety of other public uses. Private land management is mostly irrigated agriculture and livestock grazing in the valley bottom. Because of the ownership pattern in the Lemhi subbasin, private ownership can have a large influence on steelhead habitats and production.

The Lemhi River subbasin has been degraded from its historic condition. Over a century of livestock grazing and instream flow alterations have substantially altered

Table 5.3-26. Stream segments in the Lemhi River steelhead population identified from Sections 4a, 4c, and 5 of the IDEQ 2008 303(d)/305(b) integrated report (IDEQ 2009).

Waterbody	Impairment/Cause	Stream Miles
Section 5-303(d)		
Salmon River - Carmen Creek to North Fork Salmon River	Combined Biota/Habitat Bioassessments*	16.06
Wallace Creek - source to mouth	Sedimentation/Siltation; Water Temperature	7.93
Salmon River - Pollard Creek to Carmen Creek	Combined Biota/Habitat Bioassessments	5.32
Lemhi River - Kenney Creek to mouth	Total Coliform	24.63
McDevitt Creek - diversion (T19N, R23E, Sec. 36) to mouth	Low flow alterations	2.35
Mill Creek - diversion (T16N, R24E, Sec. 22) to mouth	Sedimentation/Siltation; Cause Unknown	10.41
Walter Creek - source to mouth	Combined Biota/Habitat Bioassessments	7.84
Texas Creek	Combined Biota/Habitat Bioassessments; Sedimentation/Siltation; Fecal Coliform	14.92
Eighteenmile Creek - Hawley Creek to mouth	Water temperature	2.21
Eighteenmile Creek - Clear Creek to Hawley Creek	Water temperature	8.39
Eighteenmile Creek - Divide Creek to Hawley Creek	Water temperature; Fish Bioassessments	5.96
Eighteenmile Creek - source to Divide Creek	Combined Biota/Habitat Bioassessments	29.68
Hawley Creek - diversion (T15N, R27E, Sec. 03) to mouth	Cause Unknown**	2.2
Canyon Creek - source to diversion (T16N, R26E, Sec.22)	Combined Biota/Habitat Bioassessments	70.11
Little Eightmile Creek - diversion (T16N, R25E, Sec. 02) to mouth	Water temperature	0.43
Little Eightmile Creek - source to diversion (T16N, R25E, Sec. 02)	Water temperature	25.33
Sandy Creek - source to diversion (T20N, R24E, Sec. 17)	Water temperature	12.33
Bohannon Creek - diversion (T21N, R23E, Sec. 22) to mouth	Water temperature	1.36
Bohannon Creek - source to diversion (T21N, R23E, Sec. 22)	Water temperature	13.58
Section 4c-Waters Impaired by Non-pollutants		
Mill Creek - diversion (T16N, R24E, Sec. 22) to mouth	Low flow alterations; Other flow regime alterations	10.41
Walter Creek - source to mouth	Low flow alterations	7.84
Lemhi River - confluence of Eighteenmile and Texas Creeks	Low flow alterations	10.39
Texas Creek	Other flow regime alterations	14.93
Eighteenmile Creek - Hawley Creek to mouth	Low flow alterations	2.21
Little Eightmile Creek - diversion (T16N, R25E, Sec. 02) to	Low flow alterations	0.43
Sandy Creek - diversion (T20N, R24E, Sec. 17) to mouth	Low flow alterations	2.1
Sandy Creek - source to diversion (T20N, R24E, Sec. 17)	Low flow alterations	12.33
Bohannon Creek - diversion (T21N, R23E, Sec. 22) to mouth	Low flow alterations	1.36
Geertson Creek - diversion (T21N, R23E, Sec. 20) to mouth	Low flow alterations	11.44
Geertson Creek - source to diversion (T21N, R23E, Sec. 20)	Low flow alterations	14.71
Kirtley Creek - diversion (T21N, R22E, Sec. 02) to mouth	Low flow alterations	2.28

Waterbody	Impairment/Cause	Stream Miles
Section 4a-TMDLs		
Lemhi River - Kenney Creek to mouth	Escherichia coli; Fecal Coliform	24.63
Lemhi River - Hayden Creek to Kenney Creek	Escherichia coli	12.77
McDevitt Creek - diversion (T19N, R23E, Sec. 36) to mouth	Sedimentation/Siltation	2.35
McDevitt Creek - source to diversion (T19N, R23E, Sec. 36)	Sedimentation/Siltation	19.07
McDevitt Creek - source to diversion (T19N, R23E, Sec. 36)	Sedimentation/Siltation	4.44
Lemhi River - Peterson Creek to Hayden Creek	Escherichia coli	9.6
Lemhi River - confluence of Big and Little Eightmile Creeks	Escherichia coli	5.86
Lemhi River - confluence of Eighteenmile Creek and Texas Creek	Escherichia coli	6.56
Lemhi River - confluence of Eighteenmile Creek and Texas Creek	Fecal Coliform	10.39
Eighteenmile Creek - Hawley Creek to mouth	Sedimentation/Siltation	2.21
Eighteenmile Creek - Clear Creek to Hawley Creek	Sedimentation/Siltation	8.39
Eighteenmile Creek - Divide Creek to Hawley Creek	Sedimentation/Siltation	5.96
Eighteenmile Creek - source to Divide Creek	Sedimentation/Siltation	29.68
Kenney Creek - source to mouth	Escherichia coli	20.7
Sandy Creek - diversion (T20N, R24E, Sec. 17) to mouth	Sedimentation/Siltation	2.1
Sandy Creek - source to diversion (T20N, R24E, Sec. 17)	Sedimentation/Siltation	12.33
Wimpey Creek - source to mouth	Sedimentation/Siltation	19.66
Bohannon Creek - diversion (T21N, R23E, Sec. 22) to mouth	Sedimentation/Siltation	1.36
Bohannon Creek - source to diversion (T21N, R23E, Sec. 22)	Sedimentation/Siltation	13.58
Geertson Creek - diversion (T21N, R23E, Sec. 20) to mouth	Sedimentation/Siltation	11.44
Geertson Creek - source to diversion (T21N, R23E, Sec. 20)	Sedimentation/Siltation	14.71
Kirtley Creek - diversion (T21N, R22E, Sec. 02) to mouth	Sedimentation/Siltation; Water temperature	2.28
Kirtley Creek	Sedimentation/Siltation	19.41

*The combined biota/habitat bioassessment cause is assigned to a waterbody on the 303(d) list (Category 5 of the integrated report) when bioassessment scores indicate poor habitat and/or aquatic community conditions and there is insufficient information to determine the cause(s) of the poor bioassessment scores.

***"Cause Unknown" as an impairment is used by IDEQ when instream monitoring protocols indicate the stream segment does not support the beneficial uses but the cause of the problem is not clear and may not be identifiable until a full water body assessment or TMDL is completed. For example, a review of the benthic organisms present in a water body may indicate a water quality problem.

Current Habitat Limiting Factors: NMFS determined the habitat limiting factors by reviewing multiple data sources and reports on stream conditions. Based on reports and discussions with local fisheries experts and watershed groups, NMFS conclude that the habitat limiting factors for the Lemhi steelhead population are reduced streamflow, passage barriers, juvenile fish entrainment, poor riparian conditions, sedimentation, and elevated stream temperatures. Table 5.3-27 summarizes the mechanisms by which each limiting factor affects steelhead, and the management objectives for addressing each limiting factor. Discussions of each limiting factor follow using information from IDEQ reports, the Salmon River Subbasin Assessment and Management Plan, and the Idaho Model Watershed Plan (IDEQ 1999, IDEQ 2009, ISSC 1995, NPCC 2004, Ecovista 2004).

Table 5.3-27. Primary limiting factors identified for the Lemhi River steelhead population, mechanisms by which each limiting factor affects salmonids, and management objectives for addressing each limiting factor.

Limiting Factors	Effects on Salmonids	Management Objectives to Address Limiting Factors
Stream Flow	Low stream flows reduce available habitat, can exacerbate high stream temperature conditions, and in extreme conditions can create barriers to migrations or movement (dry stream channels).	Water quantity restoration actions to improve instream flow and stream connectivity.
Migration Barriers	Migration barriers such as dams, culverts, and dewatered stream sections can create fish passage barriers. These barriers reduce or eliminate movement of adult and juvenile salmon within a watershed ultimately reducing potential spawning and rearing habitat.	Obstruction restoration actions to correct or remove fish passage barriers.
Entrainment	Juvenile fish entrainment occurs through unscreened irrigation diversions. Young salmon are at risk when they are diverted into canals or diversion ditches.	Eliminate entrainment through actions that prevent the loss of fish in irrigation diversion systems.
Riparian Condition	Poor riparian conditions reduce habitat quality, streambank stability (sediment and channel condition), shade (stream temperature), and large woody debris recruitment (habitat complexity and pool formation).	Riparian restoration actions to increase habitat complexity and large woody debris recruitment.
Temperature	High stream temperatures affect salmonid growth and development, alter life history patterns, induce disease, or exacerbate competitive predator-prey interactions. High stream temperature can also be lethal to both adult and juvenile salmon.	Riparian restoration actions to improve shade and stream cover to reduce stream temperature.
Sediment	Excess sediments can reduce juvenile habitat (rearing), aquatic insect availability (food), and spawning and incubation success (reproduction).	Riparian restoration actions to stabilize streambanks and reduce sedimentation to the stream.

1. Reduced Flow during Critical Periods.

Conditions reported for the Lemhi steelhead population suggest that reduced streamflow is the most important factor limiting abundance and productivity for this population. Streamflow conditions are also affecting spatial structure within the population by eliminating access to tributary habitat.

The NPCC (2004) identified disconnected tributaries (primarily through dewatering) as one of the major impacts on aquatic habitat quality and quantity for the Lemhi subbasin. The Idaho Model Watershed Plan (ISCC 1995) identifies insufficient flows in the Lemhi River for adult migration below Agency Creek. Irrigation diversions that disconnect tributaries from mainstem Lemhi River have contributed to lost steelhead production in Texas Creek, Agency Creek, Wimpey Creek, Big Timber Creek, Big Eightmile Creek, Withington Creek, Sandy Creek, Little Eightmile Creek, Pattee Creek, Kenney Creek, and possibly others (ISCC 1995). Many of these streams have been listed by IDEQ (2009) as impaired by altered low stream flows (a non-pollutant impairment) (Table 5.3-19). Figure 5.3-24 shows the extent of irrigation diversions in the Lemhi River.

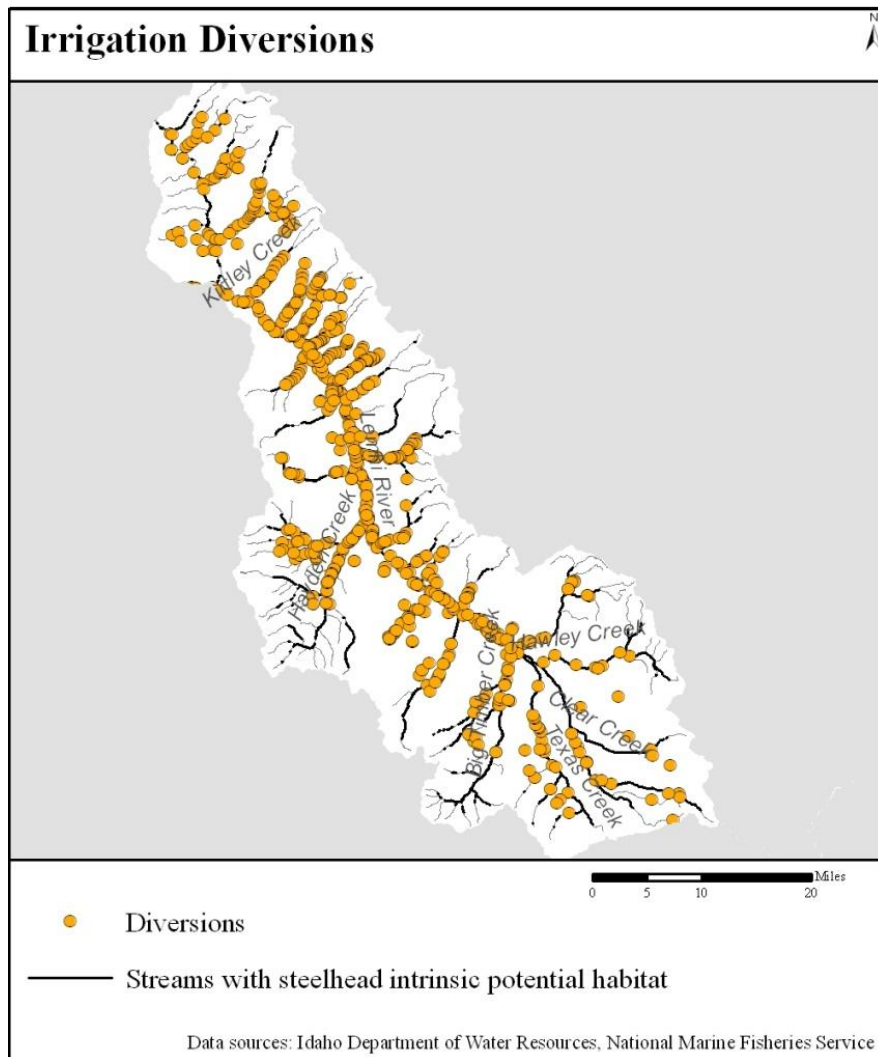


Figure 5.3-24. Surface water diversions in the Lemhi River steelhead population.

2. *Migration Barriers.*

Conditions reported for the Lemhi steelhead population suggests that migration barriers reduce abundance and productivity of steelhead, and have probably also affected spatial structure within the population. Migration barriers in this population are primarily caused by surface water withdrawals. One of the primary limiting factors for steelhead in the Lemhi River watershed is disconnected tributaries. Of the 30 tributaries to the Lemhi River, Hayden and Big Springs Creeks were historically the only tributaries that maintain connections to the mainstem year-round (NPCC 2004). Recent reconnections have been completed, from 2007 through 2010, of Big Timber, Eighteenmile, Hawley, Canyon, and Kenney Creeks.

Fish passage barriers in this population also exist at road-stream crossings. Culverts designed to pass stream flow underneath the road often create passage barriers to adults and juvenile fish. There are 22 known road culverts on USFS lands in the Lemhi subbasin (NPCC 2004). Twelve of these block adult fish passage, one allows passage, and fish passage status of the remaining eight is unknown. Trapani (2002) reported that some past barriers to migration have been fixed in Agency Creek and that one past

barrier in Pattee Creek has been eliminated. As tributaries are reconnected to the mainstem Lemhi River through stream flow enhancement projects, addressing potential steelhead barriers at road-stream crossings will become more important for this population.

3. Juvenile Fish Entrainment.

Juvenile fish entrainment can occur through unscreened irrigation diversions. Installation of fish screens in the Lemhi basin began in the late 1950s to mitigate for the effects of the Bonneville Power Administration (BPA) Columbia River hydroelectric facilities. Currently, the installation of fish screens is done in accordance with screening standards established by NMFS (NMFS 2008).

Approximately 100 irrigation diversions in the Lemhi subbasin have been equipped with fish screens, primarily through the IDFG's Fish Screen Program. On the Lemhi River mainstem, 70 existing diversions have been screened. An additional 21 diversions have been screened in the river's tributaries, including 12 on Hayden Creek and 7 in Big Springs Creek. However, to date the majority of tributary diversions remain unscreened.

4. Degraded Riparian Conditions.

Degraded riparian conditions throughout the Lemhi River subbasin may be reducing population abundance and productivity through changes in habitat quality. Trapani (2002) collected information on the Lemhi River in 1994 that suggests that riparian habitat function is below optimal condition for salmonids, particularly in terms of bank stability and pool frequency. NMFS (1996) standards classify streambank stability of greater than 90 percent as properly functioning, bank stability of 80 to 90 percent as functioning at risk, and streambank stability of less than 80 percent as not properly functioning. Streambanks in the Lemhi River were 75 percent stable from the mouth to Agency Creek, 85 percent stable from Agency Creek to Hayden Creek, and 61 percent stable from Hayden Creek to the town of Leadore (Trapani 2002), all either functioning at risk, or not properly functioning. Streambanks in Big Spring Creek were 54 percent stable and streambanks in Hayden Creek were 65 percent stable, both not properly functioning. The dominance of fast water habitat types in the Lemhi River also suggests a lack of pool forming structures that could be provided by a functional riparian zone. Fast water habitat types in the mainstem Lemhi River ranged from 75 to 92 percent of total habitat, resulting in pool habitat of only 8 to 25 percent of total habitat. A high percentage of fast water habitat types (greater than 80% of total habitat) was also noted in Big Springs and Hayden Creeks. Pool habitat is important for juvenile rearing and adult migration (resting pools) and can be formed and maintained by the presence of large woody debris and stable banks.

IDEQ's TMDL for sediment in the Lemhi River prescribes a reduction in streambank erosion and anticipates that this reduction will result from an improvement in riparian vegetation density and structure. An increase in riparian vegetation should help armor streambanks, reduce lateral recession, trap sediment, and reduce the erosive energy of the stream. This, in turn, should reduce sediment loading. TMDL prescriptions for sediment and stream surveys conducted by Trapani (2002) both indicate that functional riparian communities are a key component in reducing sediment and improving habitat conditions for salmonids in the Lemhi River subbasin. The Idaho Model Watershed Plan noted that riparian habitat condition needs improvement in all areas, particularly in Big Springs Creek where degraded habitat conditions were considered a major limiting factor (ISCC 1995). A reduction in the grazing impacts will play an important role in the recovery of riparian function.

5. Excess Sediment.

Conditions reported for the Lemhi steelhead population suggests that sediment reduces abundance and productivity of steelhead. As indicated by IDEQ (2009), some stream reaches in the Lemhi subbasin have high levels of fine sediment (Figure 5.3-25). The Idaho Model Watershed Plan (ISCC 1995) also lists sediment as a limiting factor for salmonids in the Lemhi River, primarily in tributaries to the mainstem due to unstable streambanks and irrigation returns. Cobble embeddedness measured in three reaches of the Lemhi River ranged from 40 to 45 percent (Trapani 2002). This is well above the NMFS (1996) standards, which classify cobble embeddedness greater than 30 percent as not functioning properly. Cobble embeddedness in Big Springs Creek (53%) and Hayden Creek (38%) also appear to be above optimal conditions.

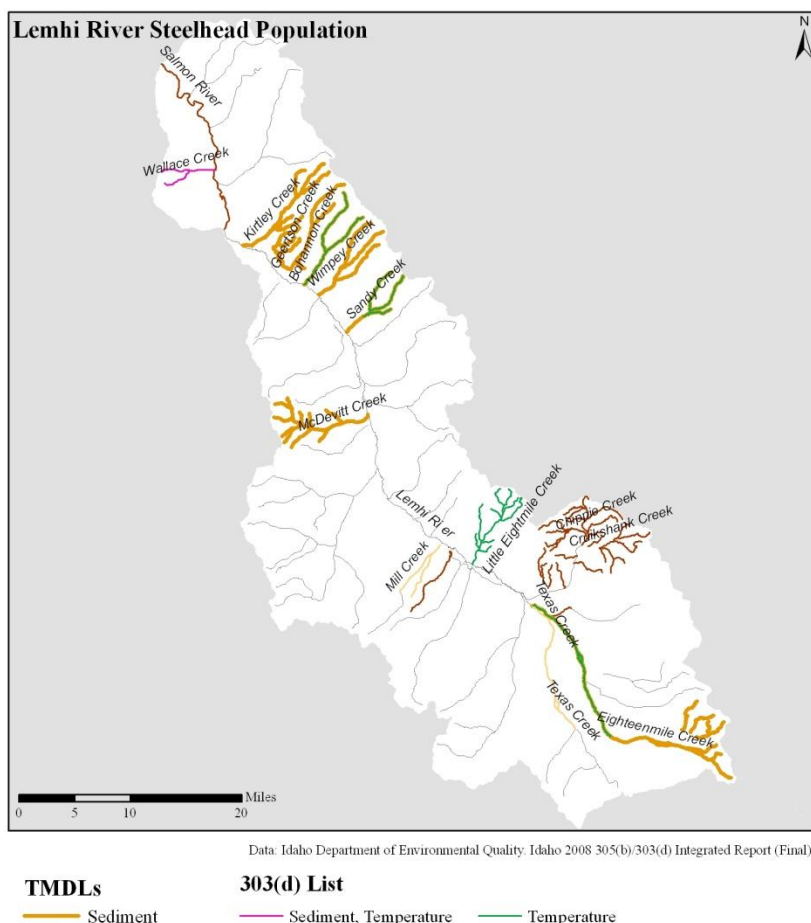


Figure 5.3-25. TMDLs on streams that support the Lemhi River steelhead population (IDEQ 2009).

6.35 mm (0.25 in.) at riffles below pool tail-outs. Percent surface fines were more variable across sampling stations within these streams and varied from 1 to 68 percent, both above and below the target. Subsurface fine levels, however, are a better indicator of the capability of spawning habitat.

IDEQ (2009) reports that high sediment levels are caused by poor stream bank stability, poor riparian condition, and roads. In addition to the TMDL streams, IDEQ placed segments of Wallace, Mill, and

IDEQ has developed sediment TMDLs for the following tributaries to the Lemhi River: McDevitt, Eighteenmile, Sandy, Wimpey, Bohannon, Geertson, and Kirtley Creeks (Table 5.3-19, Figure 5.3-25). For these streams, sediment levels exceeded fine sediment targets for percent subsurface and surface fine levels. For the TMDL, the target for percent subsurface fines, measured using McNeil core samples, was set at 28 percent or less fine particles < 6.35 mm (0.25 in), not including substrate > 63.5 mm (2.5 in). The Salmon-Challis National Forest has a similar objective of 20 percent or less fine sediment < 6.35 mm (0.25 in.) in stream substrate down to 6 inches depth for streams supporting anadromous fish. In contrast, subsurface fine sediments measured for these streams varied from 29.8 to 38.0 percent. The TMDL target for surface fines, measured using Wolman pebble counts, was set at 20 percent or less for fine particles <

Texas Creeks on the 303(d) list for sedimentation (IDEQ 2009). Wallace Creek is a tributary to the main Salmon River.

6. *Elevated Water Temperature.*

Conditions reported for the Lemhi steelhead population suggest that high temperatures may be reducing abundance and productivity of steelhead. The Salmon River Subbasin Assessment and Management Plan rated temperature as having a moderate to high influence on habitat quality in the Lemhi River from the mouth upstream to the town of Leadore, including Big Springs Creek, which runs parallel to the upper Lemhi River (NPCC, p. 3-22). The Idaho Model Watershed Plan (ISCC 1995) also listed temperature as a major limiting factor in Big Springs Creek. Elevated stream temperatures in the Lemhi River subbasin are likely caused by altered riparian vegetation and reduced stream flows through irrigation diversion withdrawals (ISCC 1995).

IDEQ has established stream temperature water quality standards to support cold water biota and salmonid spawning. The cold water biota standard is for stream temperatures not to exceed 22° C (71.6 °F) with a maximum daily average no greater than 19° C (66.2° F). The standard for salmonid spawning is for stream temperatures not to exceed 13° C (55.4° F) with a maximum daily average no greater than 9° C (48.2° F) during spawning and incubation periods identified for individual species. Steelhead in the Lemhi River generally spawn in April and May. Elevated stream temperatures are most likely during base flow periods in late summer, thus having the most impact on rearing juveniles.

Based on the standards listed above, IDEQ (2009) has placed Wallace, Eighteenmile, Little Eightmile, Sandy, and Bohannon Creeks on the 303(d) list for temperature impairment of coldwater aquatic life and/or salmonid spawning. Water temperatures measured in Eighteenmile Creek exceeded water quality standards for both coldwater biota and salmonid spawning, likely due to the presence of extensive beaver complexes, warm irrigation return flows, and reduced flow from irrigation diversions (IDEQ 2009). Temperatures in Little Eightmile Creek exceeded cold water aquatic life standards, and temperatures in Sandy Creek exceeded both salmonid spawning and cold water aquatic life standards. Measured water temperatures within Bohannon Creek exceed standards for salmonid spawning, likely due to degraded riparian habitat conditions and reduced flow from irrigation diversion.

Summary of Current Habitat Limiting Factors

Freshwater habitat in the Lemhi River subbasin has been degraded from its historical condition. Stream dewatering, alterations to riparian areas, and increased fine sediments have affected freshwater habitat quality (NPCC 2004, p. 3-18). Over a century of livestock grazing and instream flow alteration has altered stream habitat and reduced the connectivity of habitat in the Lemhi subbasin (NPCC 2004). These alterations include loss of available habitat due to low flows and disconnected tributaries, excessive sedimentation, high stream temperatures from reduced shading, and bank instability. Each of these factors may act cumulatively or independently to adversely affect Lemhi River steelhead.

Potential Habitat Limiting Factors and Threats: Several potential concerns have not yet risen to the level of limiting factors, but needs to be managed to protect habitat for Lemhi River steelhead.

1. Reduced flow during critical period due to new water development—Because instream flows are already low due to irrigation withdrawals, new water development for agriculture or other purposes could further threaten steelhead habitat.

2. Loss of floodplain connectivity and function due to development— Residential development in floodplains and riparian zones can lead to loss of riparian vegetation, loss of floodplain function, and bank instability. Increased bank instability often leads to additional channel hardening projects (e.g. riprap). Local efforts to reduce this threat to stream habitat are ongoing. For example, the Nature Conservancy and Salmon Valley Stewardship are working with private landowners to educate them on riparian setbacks and retaining vegetation along streams and to develop conservation easement agreements.

3. Degraded habitat conditions due to noxious weeds— The spread of noxious weeds can increase soil erosion and decrease native plant density.

Hatchery Programs

[To be developed]

Harvest Management

[To be developed]

Recovery Strategies and Actions

The recovery strategies that address a limiting factor may include both short-term and long-term actions. Short-term actions are projects scheduled to be implemented within the next ten years by a resource management agency or local stakeholder group. Long-term actions are categories of actions that could increase productivity for the population, but for which a specific project has not yet been proposed by a resource management agency or other stakeholder.

Natal Habitat Recovery Strategy and Actions

Priority stream reaches: The Upper Salmon Basin Watershed Project (USBWP) implementation group created a list of priority stream segments for salmonid habitat improvement projects (USBWP 2005). This prioritization report, called *Screening and Habitat Improvement Prioritization for the Upper Salmon Subbasin* (SHIPUSS), considered multiple species, including spring/summer Chinook salmon, steelhead, and bull trout. Despite including other species, the SHIPUSS prioritization overlaps considerably with habitat that has intrinsic potential for steelhead and is therefore transferable to this recovery plan.

The SHIPUSS priority stream reaches are shown in Figure 5.3-26. Under SHIPUSS, Priority I streams are those streams that have the potential to realize immediate, tangible benefits to fish if recovery efforts are directed toward them. Priority II streams are those streams that will also see tangible benefits to fish as a consequence of recovery projects, but where the benefits may be less substantial or may be delayed for quite some time (USBWP 2005).

Habitat actions: The following habitat actions, ranked in priority order, are intended to improve productivity rates, increase the effective capacity for natural smolt production in the population, and contribute to maintaining and restoring the VSP parameters while moving the population toward viable status.

1. Increase stream flows in the mainstem Lemhi River downstream from Big Springs Creek. This area currently has steelhead spawning and rearing, and increasing flow will likely increase productivity in the river section. Flow enhancement projects that contribute to currently connected sections of the Lemhi River and its tributaries are also a high priority.
2. Reconnect priority tributaries to the mainstem Lemhi River to allow steelhead to reach currently inaccessible tributary habitat and to increase flows to the mainstem Lemhi River. Reconnections may be necessary due to dewatering or manmade barriers.
3. Appropriately screen diversions so as not to entrain fish in ditches. This work should be scheduled in conjunction with the higher priority actions described above and in the context of the priorities set in the *Screening and Habitat Improvement Prioritization for the Upper Salmon Subbasin* report (USBWP 2005) for all of the populations in the upper Salmon basin.
4. Improve riparian habitat conditions, thus improving instream conditions. This work should be done as implementation of the Lemhi River TMDL, which is designed to improve riparian conditions and reduce sediment (IDEQ 1999). IDEQ prepared a TMDL for this basin in 1999 that concluded that streambank erosion and poor riparian habitat conditions along with roads and legacy mining are increasing sedimentation and erosion rates. NMFS recommends that restoration work start in the Lemhi River mainstem and in tributaries that are currently accessible to steelhead and Chinook salmon. As additional tributaries are reconnected to the mainstem Lemhi River, these newly accessible tributaries will also become priorities for riparian restoration. Riparian restoration should restore vegetation to the historical range of natural variability.

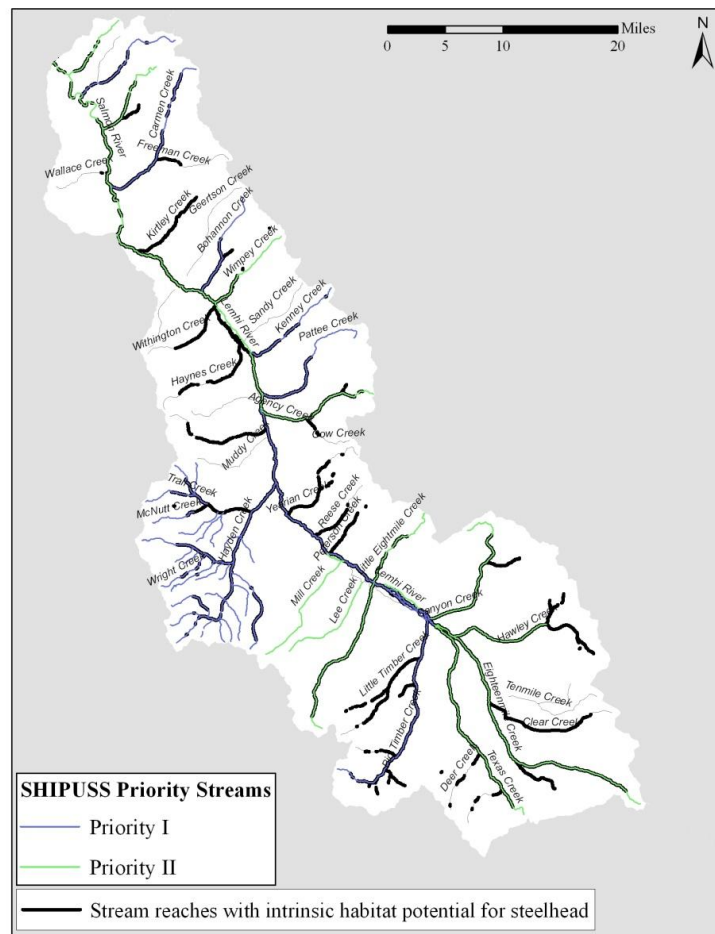


Figure 5.3-26. Priority stream reaches for the Lemhi River steelhead population.

Implementation of Habitat Actions

Implementation of habitat actions for this population will occur primarily through the work of the Custer County Soil and Water Conservation District and the Upper Salmon Basin Watershed Project. Between these two groups there is an excellent representation of private, state, and federal entities that manage land and other resources within the subbasin. These entities have created an effective process for working together, providing technical reviews of proposed projects, and working with interested

parties to accomplish conservation projects. The entities include the Idaho Department of Water Resources, local irrigation districts, the IDFG, USFS, BLM, NMFS, The Nature Conservancy, private landowners, and many other groups necessary to accomplish habitat restoration goals. Table 5.3-28 identifies limiting factors, proposed actions, priority locations, short-term projects and associated costs for recovery of the South Fork Salmon River steelhead population.

Numerous habitat restoration projects have already been completed in the Lemhi River drainage. For a detailed discussion of past projects, see the subsection of this recovery plan on the Lemhi River spring/summer Chinook population (Section 4.4.6.3). Past projects have included instream flow enhancements, removal of barriers in the mainstem Lemhi River, reconnection of tributaries, and riparian fencing. The NPCC (2004) reported that 96 projects had been completed aimed at improving fish and wildlife habitat in the Lemhi subbasin. Based on their summary, an estimated 106 km (66 miles) of stream habitat have been fenced to improve or maintain riparian habitat conditions and bank stability; an estimated 238 km (148 miles) of stream have had significant alterations made to adjacent grazing activities to reduce impacts to riparian vegetation; and an estimated 35 km (22 miles) of road or trail have been altered to reduce sediment impacts and protect wildlife (NPCC 2004). At least 18 diversions have been eliminated by consolidation, conversion to pumping, or conversion to sprinkler irrigation. Additionally, all diversions accessible to anadromous fish have been screened.

Additional projects addressing flow and passage issues were completed between 2007 and 2011. These projects have reconnected most of the upper Lemhi tributaries for all or a substantial part of the year, including Big Timber, Hawley and Eighteenmile, and Canyon Creeks. Kenny Creek in the lower Lemhi has also been reconnected. With these reconnects, lateral diversions have been breached, diversion points moved, irrigation efficiency increased, and lateral bypass routes eliminated. These actions have resulted in increased flows in tributaries and in the Lemhi River for short reaches until the water is reallocated. In addition, land has been taken out of production resulting in permanent consumptive use donations to the Water Bank and consequent flow gains to the Lemhi River.

Habitat Cost Estimate for Recovery

The habitat actions for this steelhead population, listed in Table 5.3-28, are the same suite of short-term habitat actions identified for the Lemhi River spring/summer Chinook population. The total cost of habitat improvements for the Lemhi River within the next 10 years is estimated to be \$3.6 million. These costs have been accounted for in the recovery plan subsection on Lemhi River Chinook (Section 4.4.6.3). The habitat cost estimate for Lemhi River steelhead is therefore zero.

Hatchery Recovery Strategy and Actions

[to be added]

Harvest Recovery Strategy and Actions

[to be added]

Table 5.3-28. Recovery Actions Identified for the Lemhi River Steelhead Population.

Recovery Actions Identified for the Lemhi River Steelhead Population.						
Natal Habitat Recovery Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020
Mainstem Lemhi River	Instream flow in the upper Lemhi River	Acquire irrigation flow by lease or purchase.	Acquire flow into the mainstem Lemhi in the upper reaches.	The total cost of habitat improvements for the Lemhi River within the next 10 years is estimated to be \$3.6 million. These costs have been accounted for in the recovery plan subsection on Lemhi River Chinook (4.4.6.3). The habitat cost estimate for Lemhi River steelhead is, therefore, \$0.	Acquire additional flow if necessary.	\$0
	Instream flow in the lower Lemhi River	Acquire irrigation flow by lease or purchase	Acquire 35 cfs of flow at L6 diversion using conservation agreements not to divert (35 cfs is being acquired on an annual basis)		Acquire additional flow if necessary.	\$0
Tributaries	Tributaries are disconnected from mainstem Lemhi River	Acquire tributary flow and remove barriers in order to reconnect 10 tributaries.	Improve access to 23 miles of habitat. (5 tributaries already reconnected as of 2010)		Reconnect an additional 5 tributary streams.	\$0
	Unscreened diversions on tributaries	Install screens based on SHIPUSS priorities.	Operate and maintain priority screens in the Lemhi.		Construct 12 new screens where needed.	
	Passage barriers creating lack of suitable habitat	Remove barriers	Remove 10 barriers (2 projects already completed, opening 25 miles of habitat)			
All habitat (mainstem Lemhi River and tribs)	Riparian conditions, channelization, and water quality	Implement projects to protect water quality and improve channel complexity.	11 projects involving 50 miles of habitat.			
Hatchery Recovery Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020
Harvest Recovery Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020

5.3.6.7 Little Salmon River Steelhead Population

Abstract/Overview

The Little Salmon River population is currently rated as maintained, with a tentative moderate risk rating for abundance/productivity and a moderate risk rating for diversity. The surrogate A-run population used to estimate the population's current status is currently rated at moderate risk. The Little Salmon River population is targeted to reach a level where it can be Maintained, which requires no more than moderate abundance/productivity and spatial structure/diversity risk.

Current Status	Desired Status
Maintained	Maintained

The desired status for the Little Salmon River population under this recovery plan is to achieve a level where it can be Maintained with no higher than moderate risk—a level that data indicates the population has already reached. This suggests that no recovery plan actions directed specifically at this population are necessary. However, a conservative management approach should be pursued until population-specific data become available to more accurately describe the status of this population. Recovery actions in the Snake and Columbia River migration corridor, and spawning and rearing habitat actions aimed primarily at spring/summer Chinook, will further reduce the risk for this population.

Currently, there is a high degree of uncertainty in estimating the nature and timing of a population's response to various recovery strategies, determining the gap between the current status and the desired status, and determining the amount of improvement necessary to achieve the viability target for this population. Due to this uncertainty, it is important to implement an adaptive management strategy, in conjunction with the ESA's five-year status reviews and the actions described in the Research, Monitoring, and Evaluation chapter. If the initial actions do not produce the intended response, the actions will be adjusted to produce the additional needed improvement.

Introduction

This section of the recovery plan compares the population's desired status to its current status, and describes how the population fits into the recovery strategy for the MPG and DPS. The primary sources of information are the ICTRT viability criteria (NMFS 2007b) and the ICTRT's Snake River steelhead status assessment (ICTRT 2008).

Population Status

The Population Status section describes the population's current status as defined in the ICTRT's most current status assessment (ICTRT 2008) where they discussed risk in terms of four viability parameters: Abundance, Productivity, Spatial Structure and Diversity. Other available information was also considered. The section focuses primarily on population Abundance (the total number of adults) and Productivity (the ratio of returning adults to the parental spawning adults). It compares the population's current status to the desired status in terms of both abundance and productivity. It also summarizes Spatial Structure (the amount and nature of available habitat) and Diversity (genetic traits) concerns identified by the ICTRT. Diversity concerns are also discussed in the hatchery section. More details are available in the Snake River steelhead status assessment (ICTRT 2008).

Population Description: This population of A-run fish includes the Little Salmon River and its tributaries, as well as steelhead-supporting tributaries to the lower Salmon River, downstream from the mouth of the Little Salmon (Whitebird Creek, Skookumchuck Creek, Slate Creek, and several smaller tributaries) (Figure 5.3-27). These spawning areas were grouped based on their shared life history and the fact that the lower tributaries were not judged to be large enough to support an independent population alone. The population as a whole is separated from other upstream spawning areas by 75 km, a distance likely to preclude significant straying between areas. Hatchery steelhead are released into this population for both harvest augmentation and for supplementation of the natural population.

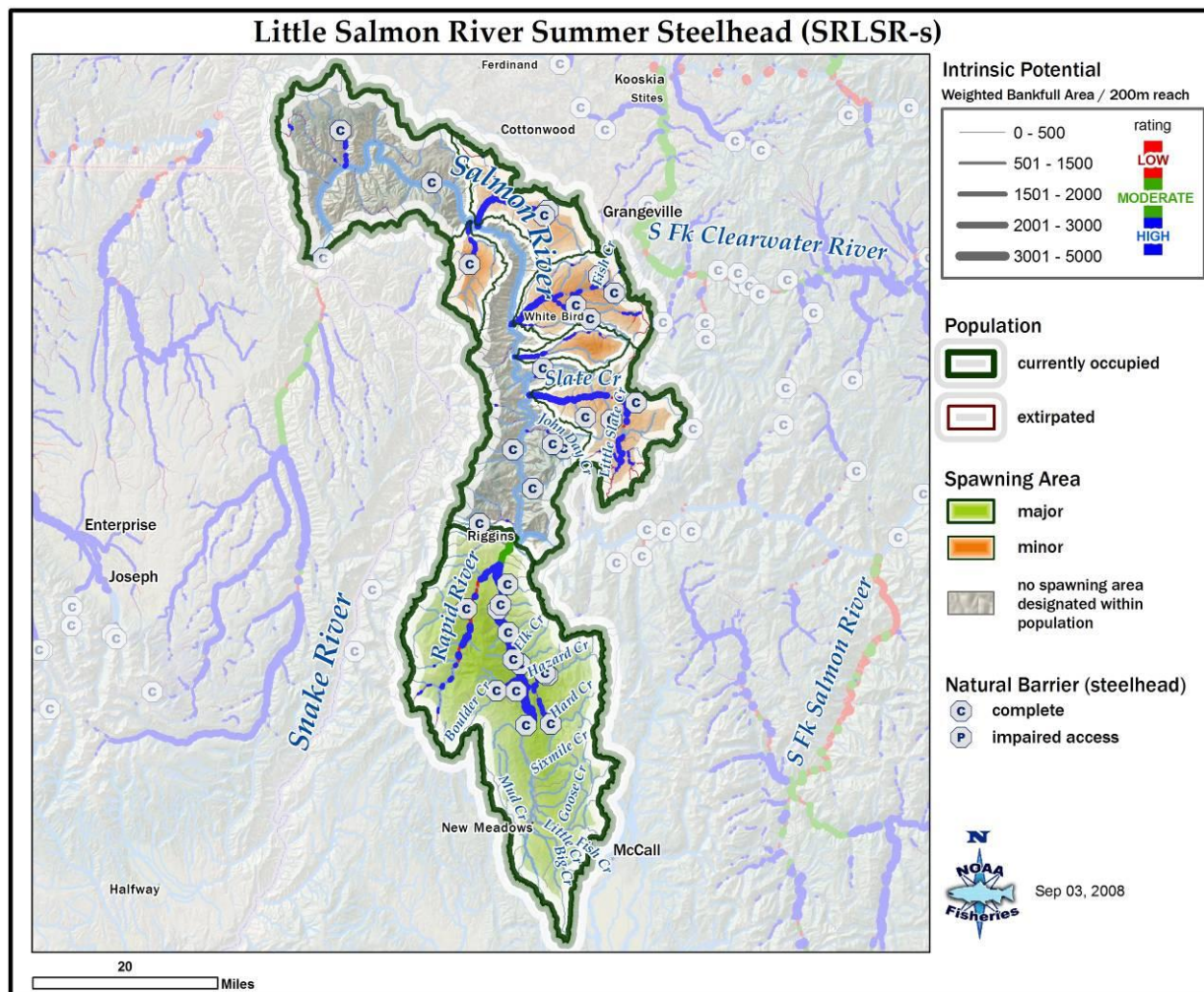


Figure 5.3-27. Little Salmon River summer steelhead population, with major and minor spawning areas.

The ICTRT classified the Little Salmon River population as “intermediate” in size and complexity based on total historical habitat potential (ICTRT 2007). Because much of the potential habitat is outside of the population’s single major spawning area, however, this population is treated as “basic” for abundance and productivity criteria, reflecting a more realistic biological scenario. A steelhead population classified as basic has a mean minimum abundance threshold of 500 natural-origin spawners with sufficient intrinsic productivity to achieve a 5 percent or less risk (“low risk”) of extinction over a 100-year timeframe. For the Little Salmon River population to achieve a 25 percent

or less risk (“moderate risk”) of extinction over 100 years, abundance and productivity targets are somewhat lower.

Abundance and Productivity: Direct estimates of current abundance (total number of adults spawning in natural production areas) are not available for the entire population. Data are available for return rates of natural-origin steelhead to Rapid River, a tributary to the Little Salmon River. At Rapid River Fish Hatchery, which produces spring Chinook, a permanent weir spans the river about 2.5 miles upstream from its confluence with the Little Salmon River. Steelhead are trapped and counted at the Rapid River Fish Hatchery weir, and the natural-origin fish are re-released into the Rapid River upstream of the weir. Annual numbers of steelhead trapped from 1965 to 2002 ranged from 11 to 221 (Table 5.3-29).

Table 5.3-29. Numbers of natural-origin steelhead trapped and released upstream of the Rapid River Fish Hatchery weir, 1965-2011 (IDFG 2011 – <http://fishandgame.idaho.gov/ifwis/hdmssearch/>).

Run year to weir	Natural- origin arrivals	Run year to weir	Natural- origin arrivals	Run year to weir	Natural- origin arrivals	Run year to weir	Natural- origin arrivals
1965	115	1976	no data	1987	68	1998	24
1966	no data	1977	no data	1988	86	1999	11
1967	no data	1978	77	1989	68	2000	18
1968	no data	1979	31	1990	117	2001	31
1969	no data	1980	44	1991	46	2002	106
1970	no data	1981	78	1992	78	2003	
1971	no data	1982	110	1993	163	2004	
1972	221	1983	77	1994	33	2005	
1973	124	1984	61	1995	47	2006	
1974	96	1985	99	1996	45	2007	26
						2008	65
						2009	89
1975	60	1986	85	1997	54	2010	151
						2011	114

Most Snake River steelhead populations (including all of the Idaho populations) do not have direct estimates of annual spawning escapements. The ICTRT generated preliminary estimates of average population abundance and productivity for these Snake River populations using annual counts of wild steelhead passing Lower Granite Dam. Estimates were developed for two average surrogate populations to represent both major run types (A and B). These abundance and productivity estimates were then compared to a viability curve for an intermediate-sized Snake River steelhead population (requiring a minimum abundance threshold of 1,000 natural-origin spawners and a productivity of 1.14 recruits per spawner).

The surrogate population for A-run steelhead above Lower Granite Dam has an estimated recent abundance of 556 and productivity of 1.86. It is rated as Moderate Risk based on current abundance and productivity, as shown in Figure 5.3-28 (25% or less risk of extinction over a 100-year timeframe). Although the current estimate of intrinsic productivity is above the minimum threshold for low risk, the current average natural abundance (recent 10-year geometric mean) is well below the ICTRT minimum threshold value of 1,000. More specific information about how the abundance and

productivity estimates were calculated is included in the ICTRT's steelhead status assessment Appendix B-1 *Calculating Representative Abundance and Productivity Estimates for Snake River A and B run Steelhead Populations*.

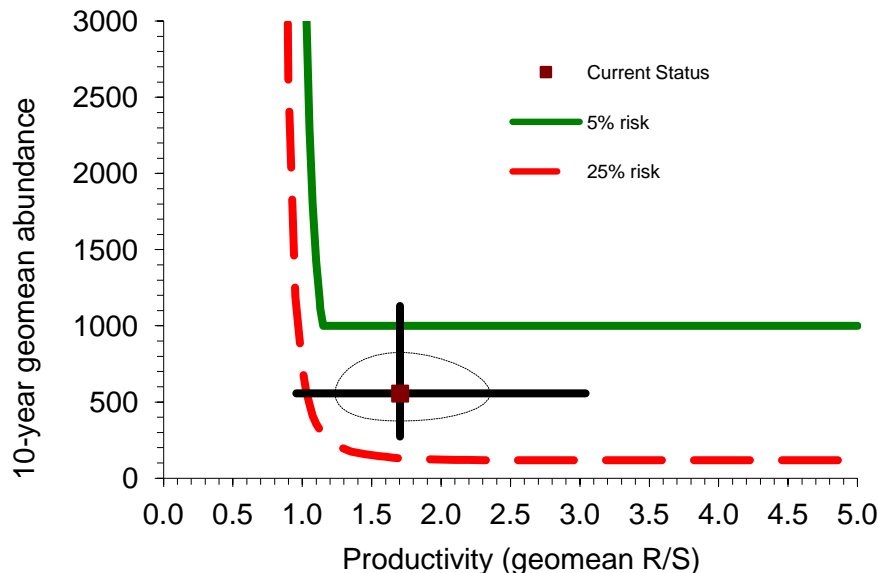


Figure 5.3-28. Snake River A-run surrogate steelhead population current estimated abundance and productivity (A/P) compared to DPS viability curve (1986-2005). Ellipse = 1 SE about the point estimate. Error bars = 90% CI for A, 98% CI for P (if point estimate >1% risk curve, the uncertainty test is <1% probability the combined A/P is at high risk).

Based on the surrogate A-run population, the ICTRT gave this population a tentative abundance/productivity rating of moderate risk.

Spatial Structure: The ICTRT identified one major spawning area (Little Salmon River) and four minor spawning areas (Slate Creek, Rock Creek, Whitebird Creek, and Skookumchuck Creek) within the population. Although only one major spawning area was identified within the population, there is a large amount of branched intrinsic potential habitat available for spawning and rearing. Current spawning, inferred from juvenile steelhead surveys, occurs in the Little Salmon River and Rapid River drainages, as well as in numerous small tributaries to the mainstem Salmon River. The lowest minor spawning area, Rock Creek, is unoccupied, increasing the gap between this population and the next downstream population. However, this increase is relatively minor considering that the next population was historically greater than 25 km downstream. The cumulative spatial structure risk is therefore low, which is adequate for this population to maintain its desired status.

Diversity: The diversity risk for this population is driven by the potentially high proportion of hatchery-origin fish spawning naturally in the population and the uncertainty regarding the effectiveness of hatchery spawners. Hatchery fish are released into the Little Salmon River both for harvest augmentation and for supplementation of the natural population. Large numbers of hatchery steelhead smolts are released within the population for harvest augmentation under dam mitigation programs. Current releases of marked smolts for harvest augmentation use out-of-MPG stocks: Hells Canyon A-run stock and Dworshak Hatchery (Clearwater River) B-run stock. Some returning

hatchery fish are not harvested in fisheries and do not recruit back to weirs or traps, and thus are assumed to be spawning naturally in the population. The prevalence of hatchery-origin spawners is assumed to be highest in the Little Salmon River drainage, exclusive of Rapid River.

An additional diversity concern for this population is the current management practice of releasing unmarked hatchery steelhead and planting eyed eggs to supplement natural production. Planned production releases for brood years 2008-2017 under the current U.S. v. Oregon TAC Interim Management Agreement for upriver Chinook, sockeye and steelhead fisheries include up to 220,000 unmarked steelhead smolts to be released into the Little Salmon River annually. At smolt-adult-return rates of 0.1-2.0 percent, returns from the smolt releases would range from 220 to 4,400 adults annually, and potentially could comprise a high proportion of total spawners in the population.

Due to the potentially high proportion of natural spawners that originate from hatchery programs, the cumulative diversity risk for this population is moderate, which is adequate for the population to maintain its desired status.

Summary: The Little Salmon River steelhead population is currently at moderate risk due to a tentative moderate risk rating for abundance/productivity and a moderate risk rating for diversity. A population-specific monitoring program is necessary to reduce the uncertainty of this rating. Table 5.3-30 shows the population's current and desired status (both maintained) in terms of cumulative abundance/productivity and spatial structure/diversity risks. A complete version of the ICTRT's draft status assessment for Snake River Basin steelhead populations is available upon request from NMFS.

Table 5.3-30. Little Salmon River population risk ratings integrated across the four viable salmonid population (VSP) metrics.

		Spatial Structure/Diversity Risk			
		Very Low	Low	Moderate	High
Abundance/ Productivity Risk	Very Low (<1%)	HV	HV	V	M
	Low (1-5%)	V	V	V	M
	Moderate (6 – 25%)	M	M	M Little Salmon River	HR
	High (>25%)	HR	HR	HR	HR

Viability Key: HV – Highly Viable, V – Viable, M – Maintained, and HR – High Risk; shaded cells – do not meet viability criteria, with darkest cells signifying the highest risk of extinction. Percentages refer to risk of extinction over 100 years. Arrow points to desired risk status.

This population is estimated to be currently meeting its desired status of maintained, so no recovery plan actions directed specifically at this population are necessary at this time. However, the following sections on limiting factors and recovery strategies are included for several reasons. Considerable uncertainty is involved in achieving the desired status for all of the populations within the Salmon River MPG, so further reducing the risk status for the Little Salmon River population could provide

flexibility for meeting the delisting goal for the MPG. Due to lack of population-specific abundance and productivity data, there is also uncertainty associated with the conclusion that the Little Salmon River population is currently meeting its desired status. Finally, further reducing the extinction risk for this population could be necessary for meeting goals beyond compliance with the Endangered Species Act, such as additional harvest by the state of Idaho or interested tribes.

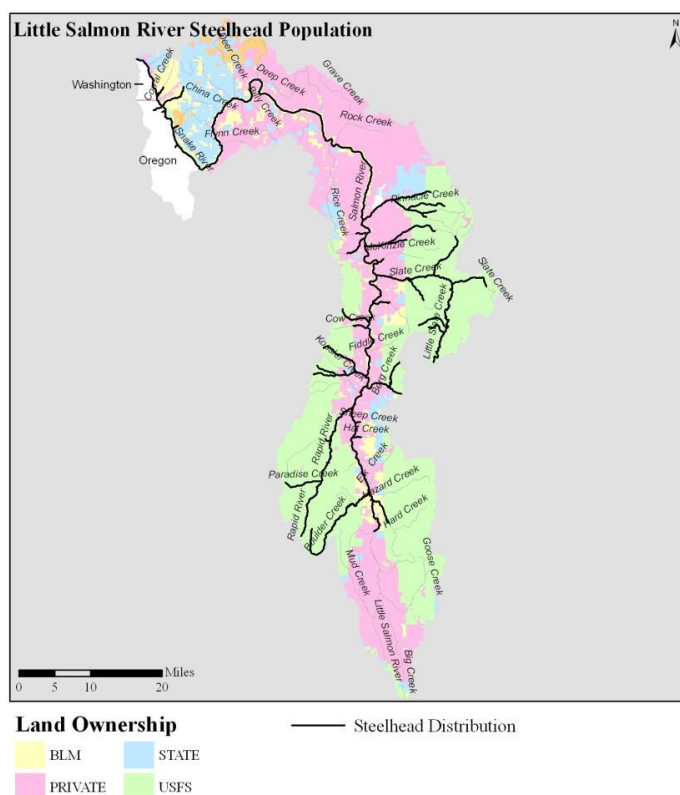
Limiting Factors and Threats Specific to Population

This section describes the limiting factors and threats that are specific for the population. The population is also affected by limiting factors and threats in the mainstem Columbia/Snake River corridor, estuary, and plume, and by climate change. Section 5.1.1 summarizes regional-level factors that affect all Idaho Snake River steelhead populations.

Natal Habitat

Habitat Conditions: The Little Salmon River steelhead population includes the Salmon River and its tributaries from the confluence with the Snake River upstream to the Little Salmon River. The drainage area within this steelhead population is about 3,979 km² (1,536 mi²). There are about 1,879 km of stream within the Little Salmon River population with less than half (895 km) occurring downstream from natural barriers (ICTRT 2009).

Watersheds draining the southwest side of the Salmon River include the Little Salmon River and smaller streams such as Sherwin, Rice, Billy, and Cottonwood Creeks. Watersheds draining the northeast side of the Salmon River include Eagle, Deer, Rock, Whitebird, Skookumchuck, and Slate Creeks. With the exception of the Little Salmon River most of the streams are small, draining a diverse area of deeply dissected canyons, V-shaped valleys, or grasslands. The topography and climate varies from hot and dry to more cool and moist mountainous areas.



Steelhead Distribution Data: StreamNet Generalized Fish Distribution - Summer Steelhead, Pacific Northwest (Updated February 2009), StreamNet Project, Portland, Oregon.

Figure 5.3-29. Land ownership pattern within the Little Salmon River steelhead population.

Steelhead are distributed throughout most of the area but are generally found in tributaries on the northeast side of the Salmon River and in the Little Salmon River and Rapid River (Figure 5.3-29). Stream size, natural barriers, and intermittent stream flow limit steelhead use in many of the smaller streams. The quality of steelhead spawning and rearing habitat in the Little Salmon was rated as mostly excellent while much of the Lower Salmon was rate as fair to good condition (NPCC 2004, p 1-36).

Land ownership within Little Salmon River steelhead population is primarily USFS (41%) and private lands (40%). The BLM, state of Idaho, and others make up the remaining 19 percent (Figure 5.3-29). Land ownership within the population is divided with private lands in the upper Little Salmon River and along the mainstem Salmon River, and with USFS lands occupying higher elevations downstream

to Skookumchuck Creek. Downstream from Skookumchuck Creek the majority of the land ownership is private, state, and BLM. State and BLM lands are intermixed with private land along most of the Salmon River.

Land uses on non-federal lands include agriculture, logging, roads, livestock grazing, recreation, development, road construction, and water development uses. Mining was historically a major land use along the Salmon River and in the Florence area in the upper Slate Creek drainage. Land uses that occur on federal lands include timber harvest, roads, livestock grazing, mining, and recreation. These land uses have had varying levels of effects on riparian areas, water quality, stream channels, and fish habitat. Increased sedimentation and stream channelization have occurred in areas with logging and road building, and many of the large tributaries to the lower Salmon River have been altered by riparian degradation due to grazing, road construction, and development. State Highway 95, which runs along the Little Salmon River, has influenced the lower 55 km of the river. A series of rock falls halfway up the Little Salmon River blocks anadromous fish access to the Little Salmon headwaters (see Figure 5.3-27). Upstream from the falls aquatic and riparian habitat has been degraded and may contribute to stream temperature and sediment conditions downstream.

Increasing levels of recreation pose a threat to aquatic habitat in this area. Illegal all-terrain vehicle use (ATV) has been identified as a resource concern in parts of the subbasin. Erosion, rutting, soil compaction, and damage to vegetation has been documented as ATV users pioneer cross-country trails to access new areas (USDA 2003a, p. III-169).

Along the Little Salmon River, recreational fishing has also begun to impact stream habitat. Much of the fishing is concentrated along a few miles of river, most of which is privately owned and managed. Although the influx of fishermen over the last few years has benefited the local economy, it has also concentrated impacts on streambanks and private property in the areas fished. Impacts include damage to riparian vegetation and garbage and sewage dumped directly into the river (Ecovista 2004, p. 104).

IDEQ's Integrated (303(d)/305(b)) Report identifies stream segments that are not fully supporting their assessed beneficial uses. These impaired stream segments are listed in Table 5.3-31 under section 5 (impaired waters that need a TMDL), section 4c (waters impaired by non-pollutants), and section 4a (impaired waters that have an EPA-approved TMDL) (IDEQ 2009).

Table 5.3-31. Stream segments in the Little Salmon River steelhead population identified from Sections 4a, 4c, and 5 of the IDEQ 2008 303(d)/305(b) integrated report (IDEQ 2009).

Waterbody	Impairment/Cause	Stream Miles
Section 5- Impaired Waters Needing a TMDL		
Cottonwood Creek - source to un-named tributary	Sedimentation/Siltation	22.65
Billy Creek - source to mouth	Combined Biota/Habitat Bioassessments*	5.16
Rice Creek – tributaries	Sedimentation/Siltation	55.28
Salmon River - Slate Creek to Rice Creek	Mercury	27.88
Rock Creek - Grave Creek to mouth	Sedimentation/Siltation	3.73
Rock Creek - source to Grave Creek	Sedimentation/Siltation	85.49
Grave Creek - headwaters to unnamed trib	Sedimentation/Siltation	27.44
Grave Creek - unnamed trib to Rock Creek	Sedimentation/Siltation	3.38
Deep Creek - source to unnamed tributary	Water temperature; Nutrient/Eutrophication Biological Indi; Sedimentation/Siltation; Escherichia coli	28.30
Deer Creek – tributaries	Sedimentation/Siltation	20.88
Deer Creek - source to WF Deer Creek	Sedimentation/Siltation	26.89
Deer Creek - upstream from waterfall	Sedimentation/Siltation	4.50
Little Salmon River - Round Valley Creek to mouth	Sedimentation/Siltation	98.52
Mud Creek - source to mouth	Benthic-Macroinvertebrate Bioassessment	8.13
Section 4c-Waters Impaired by Non-pollutants		
Little Salmon River - 4th order	Water temperature	4.29
Little Salmon River - 5th order	Escherichia coli; Phosphorus (Total); Water temperature	17.05
Big Creek - 2nd order rangeland section	Escherichia coli; Phosphorus (Total); Water temperature	4.39
Section 4a- Impaired Waters with EPA-approved TMDLs		
Deep Creek - source to unnamed tributary	Other flow regime alterations: Physical substrate habitat alterations	28.30
Little Salmon River - 5th order	Physical substrate habitat alterations	24.88

*The combined biota/habitat bioassessment cause is assigned to a waterbody on the 303(d) list (Category 5 of the integrated report) when bioassessment scores indicate poor habitat and/or aquatic community conditions and there is insufficient information to determine the cause(s) of the poor bioassessment scores.

Current Habitat Limiting Factors: NMFS determined the habitat limiting factors by reviewing multiple data sources and reports on stream conditions. Based on reports and discussions with local fisheries experts and watershed groups, NMFS conclude that the habitat limiting factors for the Little Salmon steelhead population are sedimentation, passage barriers, reduced streamflow, habitat complexity, and elevated stream temperatures. Table 5.3-32 summarizes the mechanisms by which each limiting factor affects steelhead, and the management objectives for addressing each limiting factor. Discussions of each limiting factor follow using information from USFS reports, IDEQ reports, and the Salmon Subbasin Assessment and Management Plan (USFS 2007; IDEQ 2006, 2009; NPCC 2004; Ecovista 2004).

Table 5.3-32. Primary limiting factors identified for the Little Salmon River steelhead population, mechanisms by which each limiting factor affects salmonids, and management objectives for addressing each limiting factor.

Limiting Factors	Effects on Salmonids	Management Objectives to Address Limiting Factors
Sediment	Excess sediments can reduce juvenile habitat (rearing), aquatic insect availability (food), and spawning and incubation success (reproduction).	Riparian restoration actions to stabilize streambanks and reduce sedimentation to the stream.
Migration Barriers	Migration barriers such as dams, culverts, and dewatered stream sections can create fish passage barriers. These barriers reduce or eliminate movement of adult and juvenile salmon within a watershed ultimately reducing potential spawning and rearing habitat.	Corrections or removal of fish passage barriers.
Stream Flow	Low stream flows reduce available habitat, can exacerbate high stream temperature conditions, and in extreme conditions can create barriers to migrations or movement (dry stream channels).	Water quantity restoration actions to improve instream flow and stream connectivity.
Temperature	High stream temperatures affect salmonid growth and development, alter life history patterns, induce disease, or exacerbate competitive predator-prey interactions. High stream temperature can also be lethal to both adult and juvenile salmonids.	Riparian restoration actions to improve shade and stream cover to reduce stream temperature.
Habitat Complexity	Reduced habitat quality as measured by pool frequency, pool quality, and sufficient LWD reduces juvenile rearing and adult holding.	Restoration of instream and riparian habitats.

1. Excess Sediment.

Conditions reported for the Little Salmon River steelhead population suggest that elevated sediment levels are reducing population abundance and productivity. Sediment was 303d-listed on about 377 miles of stream, including Deer, Deep, Grave, Rice, and Rock Creeks, as well as the Little Salmon River (Table 5.3-31; Figure 5.3-30). TMDLs have been completed for Rock and Deep Creeks while Deer, Graves, and Rice Creeks have been recommended for delisting for sediment (IDEQ 2009). In Deep and Rock Creeks, load allocations have been set and will require implementation of Best Management Practices to address excess sediment loading. As indicated by IDEQ (2006), the Little Salmon River from Round Valley Creek to the mouth showed support of beneficial uses, but IDEQ was unable to analyze the effect of coarse sediment in the system.

Coarse sediment transported as part of the 1997 flood is potentially reducing salmonid spawning in the mainstem Little Salmon River and leading to channel aggradation. In 1997, flooding caused channel down-cutting, lateral

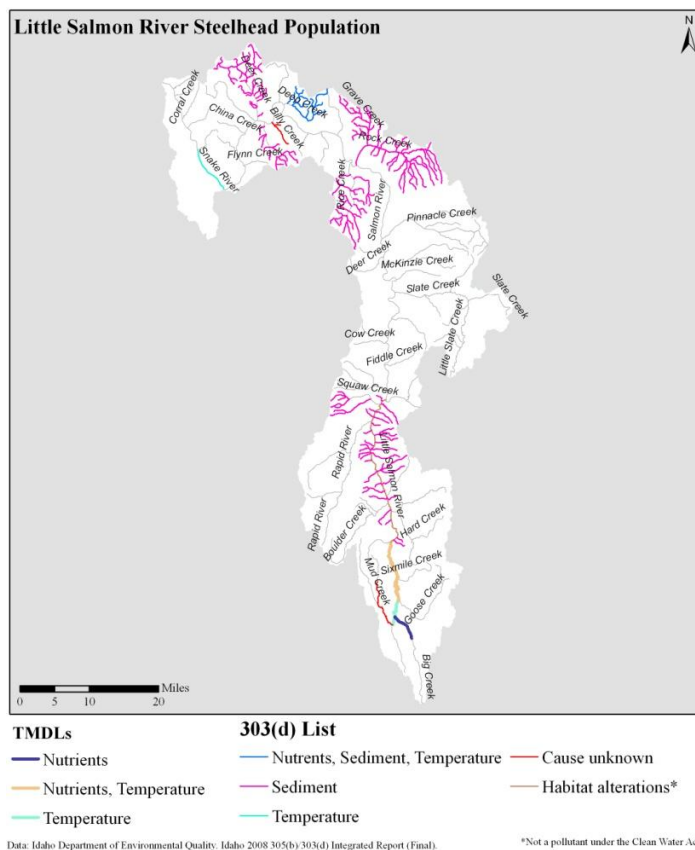


Figure 5.3-30. Stream segments in the Little Salmon River steelhead population identified from Section 4a, 4c, and 5 of the IDEQ 2008 303(d)/305(b) integrated report (IDEQ 2009).

movement of the river, and loss of riparian vegetation, leading to debris avalanches and slumps. Segments of Highway 95 were completely washed out and many nearby houses were partially or totally destroyed. As indicated by IDEQ (2006), the erosion hazard is high along the Little Salmon River from Round Valley Creek to Rattlesnake Creek. IDEQ proposes to list the Little Salmon River from Round Valley Creek to the mouth for habitat alteration and delist for sediment. IDEQ's listing for habitat alteration recognizes that the system has changed due to the construction of the highway and the channel remains constricted, leading to potential coarse sediment loading problems.

In the Little Salmon River, the USFS (2007) has indicated that sediment levels (surface fines and/or substrate embeddedness) are above desired conditions in streams evaluated in the upper, middle, and lower Little Salmon River as well as Hazard Creek. Percent surface fines were variable over the analysis area, reflecting local subwatershed conditions and land uses. Observations indicate that roads, grazing, agriculture, and recreation are contributing factors to current sediment conditions. Overall road density and roads within riparian conservation areas were particularly high in the upper and middle Little Salmon River.

The Nez Perce National Forest (NPNF 2006) identified excess sediment as a threat in many subwatersheds of the Lower Salmon and Little Salmon Rivers. Table 5.3-33 shows the qualitative ranking given to each subwatershed to indicate the potential for sediment (as well as other factors) to limit salmonid spawning, rearing, or migration (1 - high risk, 2 - moderate risk, 3 - minor risk). Although excess sediment was mostly ranked as a minor or moderate threat, sediment concerns appear to be a widespread. The sources most frequently identified were road crossings and streamside roads.

Table 5.3-33. Threats identified by the NPNF for subwatersheds (HUC 6) in the Lower Salmon and Little Salmon Rivers. Risk ranking, threats to abundance and production, and primary and secondary sources were identified for different life stages of fish.

HUC6-Subwatersheds	Life Stage	Risk Rank*	Risk/Threat	Primary Source	Secondary Source
Salmon River-Fiddle Creek	Spawning	3	Excess Sediment	Road crossings	Mass wasting
Race Creek	Spawning	2	Excess Sediment	Streamside/upland harvest	Streamside roads
	Rearing	3	Lacks LWD	Timber Harvest	Streamside roads
Salmon River-China Creek	Spawning	3	Excess Sediment	Road crossings	Streamside roads
	Rearing	3	Excess Sediment		
	Rearing	3	Lacks LWD	Streamside roads	
	Rearing	3	Channel Simplification	Livestock Grazing	Invasive weeds
	Migration	3	Barrier	Road	
John Day Creek	Spawning	3	Excess Sediment	Road Crossing	Mass wasting
Salmon River-Sherwin Creek	Spawning	2	Excess Sediment	Streamside road	Road crossings
	Rearing	1	Channel Simplification	Road crossings	Streamside road
	Migration	2	Barrier	Road crossings	
Upper Little Slate Creek	Spawning	1	Excess Sediment	Road crossings	OHV trail crossings
	Spawning	2	Barrier	Road crossings	Streamside/upland harvest
	Rearing	1	Excess Sediment	Road crossings	Dredge mining
	Rearing	2	Channel Simplification	Livestock grazing	Dredge mining
	Rearing	2	Flow alteration	Streamside/upland harvest	Livestock grazing
	Migration	2	Barrier	Road crossings	Dredge mining
Lower Little Slate Creek	Spawning	2	Excess Sediment	Road cross	Upstream sources
	Spawning	2	Introgression	Non-native fish	
	Rearing	2	Excess sediment	Road crossings	Upstream sources
	Rearing	2	Competition	Non-native fish	
	Migration	3	Barrier	Trail Crossing	
Upper Slate Creek	Spawning	3	Excess sediment	Road crossings	

HUC6-Subwatersheds	Life Stage	Risk Rank*	Risk/Threat	Primary Source	Secondary Source
Lower Slate Creek	Rearing	3	Flow alteration	Streamside/upland harvest	Road crossings
	Spawning	1	Excess sediment	Road crossings	Upstream sources
	Rearing	2	Flow alteration	Streamside/upland harvest	
Salmon River-Mckenzie Creek	Spawning	3	Excess Sediment	Road Crossings	
Skookumchuck Creek	Spawning	2	Excess Sediment	Road Crossings	Streamside/upland harvest
	Rearing	2	Flow alteration	Road Crossings	Streamside/upland harvest
	Migration	3	Barrier	Road Crossings	
Deer Creek	Spawning	3	Excess sediment	Road Crossings	Livestock grazing
SF White Bird Creek	Spawning	1	Excess sediment	Road Crossings	Streamside/upland harvest
	Migration	2	Barrier	Road Crossings	Streamside/upland harvest
NF White Bird Creek	Spawning	1	Excess sediment	Road Crossings	
	Migration	1	Barrier	Road Crossings	
Rapid River-Copper Creek	Spawning	3	Excess sediment	Road Crossings	
Lower Rapid River	Spawning	3	Excess sediment	Road Crossings	
	Migration	3	Barrier	Road Crossings	
Little Salmon-Sheep Creek	Spawning	3	Excess sediment	Road Crossings	Mass wasting
Squaw Creek	Spawning	2	Excess sediment	Streamside road	Road Crossings
	Rearing	2	Lacks LWD	Streamside road	
	Migration	2	Barrier	Road Crossings	

1 - high risk, 2 - moderate risk, 3 - minor risk

2. Migration Barriers.

In the Middle and Upper Little Salmon, the USFS (2007) noted many man-made physical barriers in from road crossings and diversion structures. However, these potential barriers are upstream from a natural falls that blocks steelhead migration and are therefore beyond the scope of steelhead restoration efforts. In the Hazard Creek watershed, there are approximately 92 road-stream crossings. It is likely many of these crossings present barriers to fish passage (USFS 2007), but most barriers are upstream from a natural waterfall 3.7 miles upstream from the mouth that blocks steelhead passage. In the Lower Little Salmon River, some culverts are barriers between Boulder Creek and its tributaries. Man-made barriers are also likely present on lesser tributaries in the Lower Little Salmon River, although some of the tributaries also have natural barriers blocking steelhead access. Migration barriers may also exist on tributaries on the Lower Salmon River, such as Deer Creek, which has a culvert on private land blocking access to upstream habitat.

In subwatershed summaries presented by the NPNF (2006), the status of fish passage at many stream-road crossings was undetermined, including in the China, Sherwin, upper Little Slate, Skookumchuck, and White Bird subwatersheds in the Lower Salmon River, and Lower Rapid River and Squaw Creek subwatersheds in the Little Salmon River (see Table 5.3-31). A comprehensive inventory and assessment of potential man-made barriers to steelhead migration within the Little Salmon River population would provide valuable information for potential restoration opportunities.

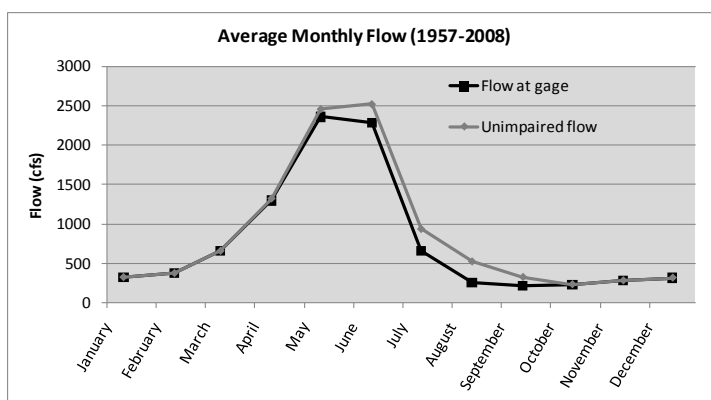


Figure 5.3-31. Mean monthly flow for the Little Salmon River at USGS gage at Riggins (USGS 13316500). The unimpaired flow at Riggins includes the gage flow added to estimated consumptive water use from irrigation.

3. Reduced Flow during Critical Periods.

Water withdrawals for agricultural in the upper Little Salmon meadows are impairing summer base flows in main Little Salmon River, leading to a decrease in available habitat in Little Salmon River and to elevated stream temperatures. Figure 5.3-31 compares the average monthly flows from gage data to estimated unimpaired flows at the mouth of the Little Salmon River. Unimpaired flows were estimated by adding estimates of monthly consumptive water use from irrigation to the monthly gaged flows. Figure 5.3-31 shows that from July to September measured flows at the Little Salmon gage are substantially less than estimated unimpaired flows. Water rights in the Little Salmon River subbasin exist for a cumulative 679 cfs maximum diversion rate, which is greater than mean base flows for the Little Salmon River. Eighty-nine percent of irrigated acres in the subbasin occur in the upper meadows, above the passage barrier at RM 24 of the mainstem Little Salmon River and above the mouth of Round Valley Creek. The estimated consumptive use from irrigation taking place above Round Valley Creek during the growing season is 108 cfs. Water withdrawals in the upper meadows thus contribute to reduced flow and elevated temperature downstream in the Little Salmon River.

Water withdrawals also occur on tributaries to the main Salmon River and may reduce base flows in these tributaries. IDEQ has indicated altered hydrology in Deep Creek, a tributary to the Lower Salmon River, but it was noted as an intermittent stream (IDEQ 2007). Low or altered stream flows were also indicated in Trail Creek, Denny Creek, Skookumchuck Creek, Slate Creek, and potentially Squaw Creek.

4. Elevated Water Temperature.

Stream temperature impairment was indicated on about 54 miles of stream in the population, including Deep Creek, Big Creek, and the Little Salmon River. Based on recommendations by IDEQ, Rice, Rock, Graves, and John's Creek will be placed in Section 4a for temperature TMDLs. Average lack of shade for these streams was 12 to 32 percent. Deep Creek was recommended for removal from the 303(d) list for temperature impairment (IDEQ 2009).

IDEQ (2009) reported that in the upper reaches of the Little Salmon River (above the falls), high water temperatures are suboptimal for salmonids, primarily due to lack of shade. Given the high stream temperatures, IDEQ prepared a temperature TMDL in 2006 for the Little Salmon River upstream from Round Valley Creek. Because natural background conditions for stream temperatures in this watershed may exceed state water quality criteria, the TMDL calls for restoring natural levels of riparian shade.

IDEQ has not developed a TMDL for temperature below RM 24 because water temperatures generally remain below 22°C and support cold water aquatic life (IDEQ 2006). As the Little Salmon River flows towards the Salmon River, larger tributary streams like Hazard/Hard Creek, Boulder Creek, and Rapid River contribute cooler water. However, between Little Salmon River mile 24 and the mouth of Hazard Creek, there is a 4.5 mile section of accessible steelhead critical habitat that does not support salmonid migration, spawning, or rearing (BLM 2000), likely due to high water temperatures. Below the mouth of Hazard Creek, the large volume and cooler temperatures of Hazard Creek partially mitigate the impaired waters of the Little Salmon River. Summer snorkeling surveys found very few juvenile rainbow trout/steelhead upriver from Hazard Creek, while downriver from Hazard Creek the river had significantly more rainbow trout/steelhead (BLM 2000).

5. *Reduced Habitat Complexity and Quality.*

Human-caused disturbances such as roads, timber harvest, livestock grazing, and development have affected habitat quality in the Lower Salmon River and Little Salmon River drainage. The Stream Habitat Index (SHI) calculated by IDEQ evaluates a range of habitat inventory parameters including bank stability, riparian cover, percent surface fines, pool quality, and large organic debris. Scores range from 1-3, with 3 being the highest score. SHI scores were 1 for all segments evaluated on the Little Salmon River (IDEQ 2006). Information provided by the USFS (2007) also indicates some poor habitat conditions; pool frequency, pool quality, and LWD were deficient in streams throughout much of the Little Salmon River drainage. The lack of LWD and channel simplification were noted in several subwatersheds of the Lower Salmon and Little Salmon River (see Table 5.3-33 and Table 5.3-34). A major portion of the Little Salmon River has been riprapped to protect private land roads from the stream's natural processes. Highway 95 parallels the Little Salmon, eliminating floodplains that dissipate stream energy, and confining the stream to a narrow channel with high velocity flows that scour streambanks and channels.

Table 5.3-34. Limiting factors identified for streams in subwatersheds of the Little Salmon River below the natural falls (USFS 2007).

Stream	Limiting Factors
Hazard Creek subwatershed streams	
Brown Creek	Sediment, road density
Hard Creek	Substrate embeddedness, barriers & other road effects
Hazard Creek	Substrate embeddedness, barriers & other road effects
Lower-Little Salmon subwatershed streams	
Trail Creek	Sediment, elevated summer temperatures, low flows, LWD, pools, man-caused barriers
Boulder Creek	Sediment/substrate embeddedness, barriers, road density
Sheep Creek	Lack of quality pools, sediment
Denny Creek	Barriers, low flows, lack of quality pools, sediment
Lockwood Creek	Lack of quality pools, channel & streambank scouring, lack of instream cover, sediment
Rattlesnake Creek	Lack of quality pools, channel & streambank scouring, barriers, lack of instream cover, sediment
Fall Creek	Lack of quality pools
Elk Creek	Lack of quality pools
Squaw Creek	Sediment, temperature, lack of quality pools, man-caused barriers, water diversion

Potential Habitat Limiting Factors and Threats: Several potential concerns have not yet risen to the level of limiting factors, but need to be managed to protect steelhead habitat in the Little Salmon River population area.

1. Damage to riparian habitat by all-terrain vehicle use.
2. Concentrated fishing along the lower Little Salmon River, which could damage streambanks, riparian vegetation, and water quality.

Hatchery Programs

[To be developed]

Harvest Management

[To be developed]

Recovery Strategies and Actions

The recovery strategies that address a limiting factor may include both short-term and long-term actions. Short-term actions are projects scheduled to be implemented within the next ten years by a resource management agency or local stakeholder group. Long-term actions are categories of actions that could increase productivity for the population, but for which a specific project has not yet been proposed by a resource management agency or other stakeholder.

Natal Habitat Recovery Strategy and Actions

Priority stream reaches: The strategy for addressing limiting factors should first address limiting factors in major and minor spawning areas such as the Little Salmon River, Slate, White Bird, Skookumchuck, and Rock Creeks, while maintaining the quality of steelhead habitat in the relatively unimpaired Rapid River (see Figure 5.3-27).

Within these major and minor spawning areas, priority stream reaches for habitat restoration projects are those with intrinsic potential habitat with a focus on Slate, Whitebird, and Boulder Creeks. Restoration efforts to improve riparian habitat will enhance shade, provide recruitment of LWD, and increase bank stability. Throughout the population additional benefits will accrue by mitigating chronic sediment sources from roads, trails, stream crossings, and OHV use. Controlling sources of sediment may require road obliteration, realignment, conversion or closure, and public education. Assessment and correction of migration barriers will provide additional spawning and rearing habitat for steelhead. In addition, restoration efforts upstream of natural barriers such as the falls on the Little Salmon River to mitigate sediment and temperature concerns could benefit downstream spawning and rearing areas for steelhead but are a low priority compared to currently occupied steelhead habitat.

Habitat actions: The following habitat actions, ranked by priority, are intended to improve productivity rates and increase the effective capacity for natural smolt production in the watershed.

1. Reduce road-related impacts on tributaries to the Little Salmon River and main Salmon River through a combination of road closures, obliterations, decommissioning, relocations, reconstructions, and maintenance. Road-related impacts include degraded riparian areas and sediment delivery to streams.
2. Inventory stream crossings (e.g. bridges and culverts) and replace those on a priority basis that block steelhead from accessing suitable habitat or that deliver sediment to steelhead habitat.
3. Reduce floodplain and channel encroachment by roads or development. In areas not prone to frequent scouring of the channel and streambanks by flood events, restore degraded riparian conditions.
4. Reduce the impacts of water diversions in the population to minimize habitat loss and elevated temperatures caused by reduced base flows. Inventory diversions on stream reaches accessible to steelhead in the Little Salmon River, Whitebird Creek, and Slate Creek watersheds to ensure diversions are screened according to NMFS criteria.
5. Encourage private landowners to restrict grazing in riparian areas, and restrict livestock grazing in riparian areas on public lands.

6. Local governments should restrict future growth along the mainstem Little Salmon River and mainstem Salmon River to minimize the need for instream and streambank stabilization projects involving hardening the stream banks (such as with riprap or bank barbs).

Implementation of Habitat Actions

Implementation of habitat actions for this population will occur primarily through the work of the USFS, IDFG, IDEQ, the Nez Perce Tribe, and county soil and water conservation districts. Other entities working on habitat restoration in this population include IDWR, BPA, BLM, NMFS, The Nature Conservancy, and private landowners. Between these groups there is an excellent representation of tribal, local, state, and federal entities that manage land and other resources within the watersheds. These entities have created an effective process for working together, providing technical reviews of proposed projects and working with interested parties to accomplish conservation on the ground.

The Nez Perce Tribe has been very active in designing and implementing projects on both public and private lands in this area. Due to the large percentage of private land ownership and rural development in the area, much of the potential habitat improvement projects for the Little Salmon River population will rely heavily upon the voluntary cooperation of private landowners. This private land ownership occurs primarily in the lower reaches of the Little Salmon and Lower Salmon River tributaries. Table 5.3-35 identifies limiting factors, proposed actions, priority locations, short-term projects and associated costs for recovery of the Little Salmon River steelhead population.

Many habitat restoration projects have already been completed in the Little Salmon and Lower Salmon Rivers. The NPCC (2004) identified 8 projects in the Lower Salmon watershed and 20 projects in the Little Salmon River watershed designed to restore fish and wildlife habitat. Additional projects were identified by IDEQ (2006, 2009) and USFS (2007). Numerous private landowners and governmental agencies have implemented conservation projects that have resulted in aquatic and riparian habitat and water quality improvements within the Little Salmon River steelhead population. The projects have included fencing, riparian and streambank restoration, grazing and nutrient management plans, septic system upgrades, road management (decommission, stabilization, closure), trail restoration, and weed control.

Habitat Cost Estimate for Recovery

The Little Salmon River steelhead population is estimated to be meeting its desired status, so no recovery plan actions directed specifically at this population are necessary at this time. However, habitat actions identified for the Little Salmon River spring/summer Chinook population should also benefit Little Salmon River steelhead. There are currently no funded projects identified for the Little Salmon River spring/summer Chinook population, but the Nez Perce Tribe is seeking funding for the projects described in Table 5.3-35.

Hatchery Recovery Strategy and Actions

[to be added]

Harvest Recovery Strategy and Actions

[to be added]

Table 5.3-35. Recovery Actions Identified for the Little Salmon River Steelhead Population.

Recovery Actions Identified for the Little Salmon River Steelhead Population.						
Natal Habitat Recovery Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020
Slate Creek, Whitebird Creek and other lower Salmon River tributaries	Riparian condition	Riparian revegetation to provide shade, stabilize banks, and increase LWD.	No actions are currently funded. The Nez Perce Tribe has identified the following actions and is pursuing funding. <ul style="list-style-type: none">- Riparian revegetation (10 acres per year);- Rehabilitate floodplain and improve connectivity to tributaries;- Riparian fencing (2 miles per year);- Road decommissioning and road drainage improvements (5 miles per year);- Streambank stabilization (1 project per year),- Fish passage surveys, and culvert replacements (1 per year).	None at this time.	None at this time.	None identified.
	Water temperature	Plant riparian vegetation, rehabilitate floodplain connectivity, reconnect tributaries, and fence riparian areas.				
	Sediment	Road decommissioning and road drainage improvements, streambank stabilization.				
	Migration barriers	Road stream crossing surveys, culvert replacements, and road decommissioning				
	Channel alteration	Riparian rehabilitation and LWD placement to increase channel complexity.				
Hatchery Recovery Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020
Harvest Recovery Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020

5.3.6.8 Secesh River Steelhead Population

Abstract/Overview

The Secesh River steelhead population is currently rated as not viable, with a tentative high risk rating for abundance/productivity. The surrogate B-run population used to estimate the population's current status is currently rated at high risk. The population is targeted to reach a level where it can be Maintained, which requires no more than moderate abundance/productivity risk.

Current Status	Desired Status
High Risk	Maintained

The actions identified in this recovery plan to occur over the next 10 years appear likely to achieve the desired status. The monitoring and research information collected in the next ten years will provide an important opportunity to complete a more detailed evaluation of the status of the species and will provide additional knowledge to guide the next round of actions under this recovery plan.

Currently, there is a high degree of uncertainty in estimating the nature and timing of a population's response to various recovery strategies, determining the gap between the current status and the desired status, and determining the amount of improvement necessary to achieve the viability target for this population. Due to this uncertainty, it is important to implement an adaptive management strategy, in conjunction with the ESA's five-year status reviews and the actions described in the Research, Monitoring, and Evaluation chapter. If the initial actions do not produce the intended response, the actions will be adjusted to produce the additional needed improvement.

Introduction

This section of the recovery plan compares the population's desired status to its current status, and describes how the population fits into the recovery strategy for the MPG and DPS. The primary sources of information are the ICTRT viability criteria (NMFS 2007b) and the ICTRT's Snake River steelhead status assessment (ICTRT 2008).

Population Status

The Population Status section describes the population's current status as defined in the ICTRT's most current status assessment (ICTRT 2008) where they discussed risk in terms of four viability parameters: Abundance, Productivity, Spatial Structure and Diversity. Other available information was also considered. The section focuses primarily on population Abundance (the total number of adults) and Productivity (the ratio of returning adults to the parental spawning adults). It compares the population's current status to the desired status in terms of both abundance and productivity. It also summarizes Spatial Structure (the amount and nature of available habitat) and Diversity (genetic traits) concerns identified by the ICTRT. Diversity concerns are also discussed in the hatchery section. More details are available in the Snake River steelhead status assessment (ICTRT 2008).

Population Description: This population includes the mainstem Secesh and its tributaries and was defined primarily based on genetic information (ICTRT 2003) (Figure 5.3-32). Microsatellite samples from the Secesh were highly differentiated from other South Fork Salmon River samples. The Secesh River population is a B-run steelhead population.

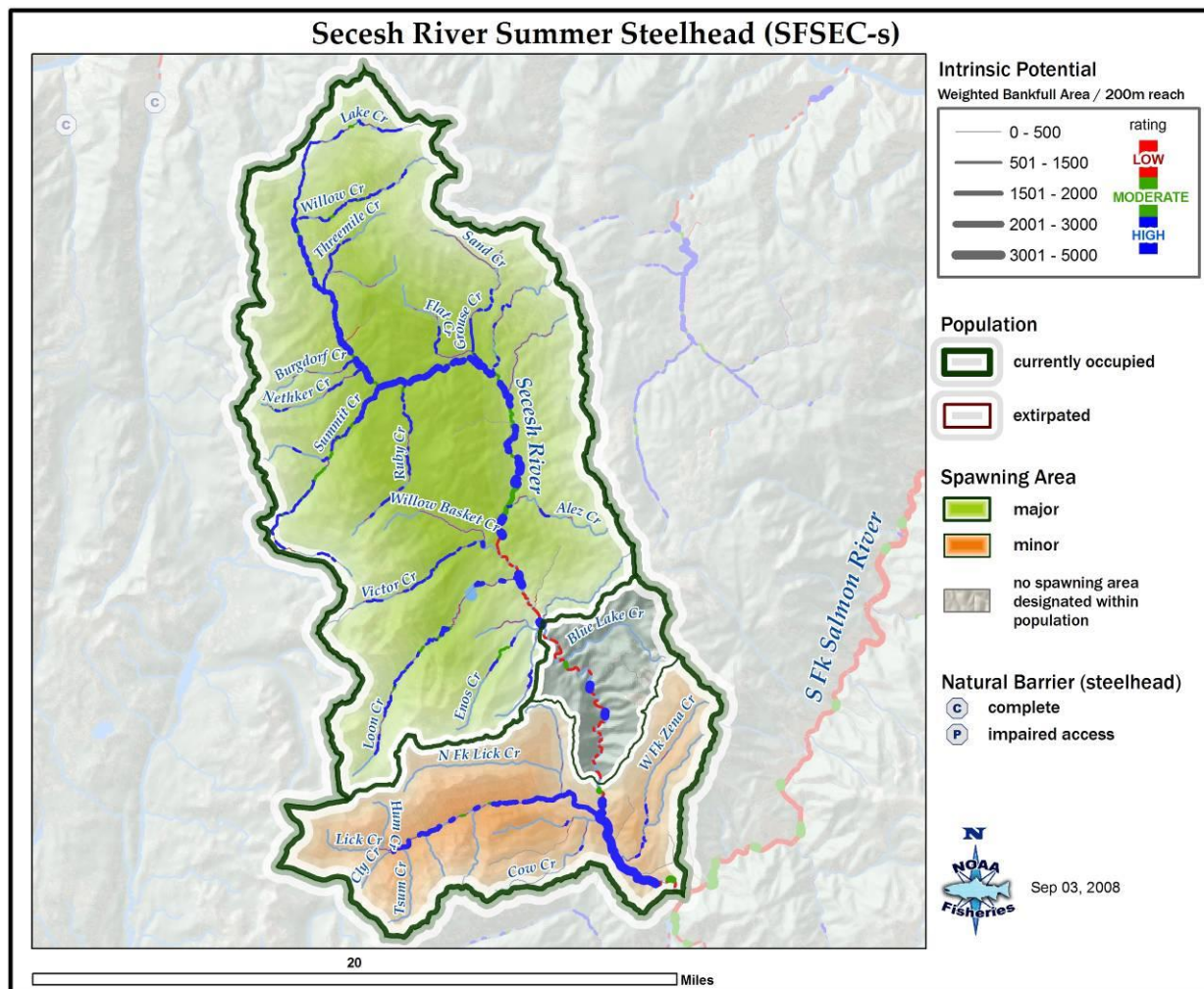


Figure 5.3-32. Secesh River summer steelhead population, with major and minor spawning areas.

The ICTRT classified the Secesh River population as “basic” in size and complexity based on historical habitat potential (ICTRT 2007). A steelhead population classified as basic has a mean minimum abundance threshold of 500 natural-origin spawners with sufficient intrinsic productivity to achieve a 5 percent or less risk (“low risk”) of extinction over a 100-year timeframe. For the Secesh River population to achieve a 25 percent or less risk (“moderate risk”) of extinction over 100 years, abundance and productivity targets are somewhat lower.

Abundance and Productivity: Most Snake River steelhead populations (including all of the Idaho populations) do not have direct estimates of annual spawning escapements. The ICTRT generated preliminary estimates of average population abundance and productivity for these Snake River populations using annual counts of wild steelhead passing Lower Granite Dam. Estimates were developed for two average surrogate populations to represent both major run types (A and B). These abundance and productivity estimates were then compared to a viability curve for an intermediate-sized Snake River steelhead population (requiring a minimum abundance threshold of 1,000 natural-origin spawners and a productivity of 1.14 recruits per spawner).

The surrogate population for B-run steelhead above Lower Granite Dam has an estimated recent abundance of 345 and productivity of 1.09. It is rated as high risk based on current abundance and productivity as shown in Figure 5.3-33. The point estimate representing current status lies just below the 25 percent risk curve for intermediate-sized Snake River steelhead populations, indicating a greater than 25 percent risk of extinction over a 100-year timeframe. More specific information about how the abundance and productivity estimates were calculated is included in the ICTRT's steelhead status assessment Appendix B-1 *Calculating Representative Abundance and Productivity Estimates for Snake River A and B run Steelhead Populations*.

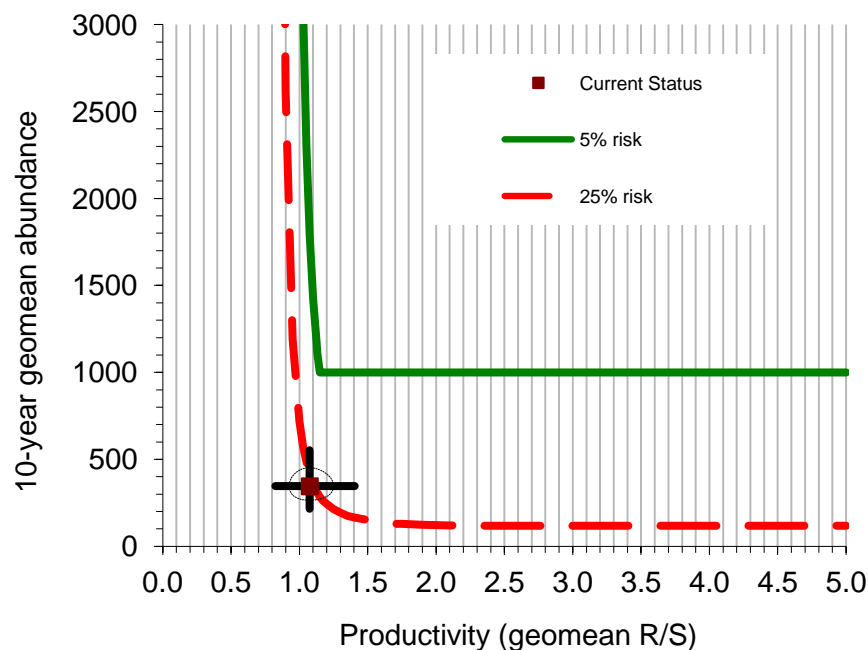


Figure 5.3-33. Snake River B-run surrogate steelhead population current estimated abundance and productivity (A/P) compared to DPS viability curve (1986-2005). Ellipse = 1 SE about the point estimate. Error bars = 90% CI for A, 98% CI for P.

Based on the surrogate B-run population, increases in abundance and productivity will be necessary for this population to reach its desired status of maintained with no more than moderate risk.

Spatial Structure: The ICTRT has identified one major spawning area (Upper Secesh) and one minor spawning area (Lick Creek) within this population. This limited spatial structure creates some inherent risk of extinction. However, because both spawning areas are currently occupied, based on juvenile surveys, the cumulative spatial structure risk is low, which is adequate for the population to meet its desired status.

Diversity: The major life history strategies historically represented in the Secesh population are unknown, but the population is currently classified as consisting only of B-run steelhead. Genetic data suggest that this population is well differentiated from other Salmon River populations. Hatchery-origin steelhead are not currently released into the population nor have they been released in the past. Cumulative diversity risk is therefore low, with is adequate for the population to meets its desired status.

Summary: The Secesh River steelhead population is currently at high risk due to a tentative high risk rating for abundance/productivity. A population-specific monitoring program will be necessary to reduce the uncertainty of this rating. In the absence of population-specific abundance data, we assume that an increase in abundance and productivity will be needed for this population to reach its desired status of maintained. Table 5.3-36 shows the population's current and desired status in terms of cumulative abundance/productivity and spatial structure/diversity risks. A complete version of the ICTRT's draft status assessment for Snake River Basin steelhead populations is available upon request from the NMFS.

Table 5.3-36. Secesh River population risk ratings integrated across the four viable salmonid population (VSP) metrics.

		Spatial Structure/Diversity Risk			
		Very Low	Low	Moderate	High
Abundance/ Productivity Risk	Very Low (<1%)	HV	HV	V	M
	Low (1-5%)	V	V	V	M
	Moderate (6 – 25%)	M	M	M	HR
	High (>25%)	HR	HR Secesh River	HR	HR

Viability Key: HV – Highly Viable, V – Viable, M – Maintained, and HR – High Risk; shaded cells – do not meet viability criteria, with darkest cells signifying the highest risk of extinction. Percentages refer to risk of extinction over 100 years. Arrow points to desired risk status.

Limiting Factors and Threats Specific to Population

This section describes the limiting factors and threats that are specific for the population. The population is also affected by limiting factors and threats in the mainstem Columbia/Snake River corridor, estuary, and plume, and by climate change. Section 5.1.1 summarizes regional-level factors that affect all Idaho Snake River steelhead populations.

Natal Habitat

Habitat Conditions: The Secesh River steelhead population includes the mainstem river and all its tributaries. The Secesh River enters the main South Fork Salmon River near the confluence of the East Fork South Fork Salmon River. The geographic area encompassed within this population has a drainage area of approximately 1,063 square miles (642 km²). The drainage is semiarid, with most of the precipitation falling as snow in the higher elevations. Precipitation averages about 31 inches per year, falling mostly as snow. The heaviest precipitation usually falls as snow in November and December. Occasionally, storms move over the area producing warm rainstorms in late fall or early winter. These storms can cause significant rain-on-snow events, resulting in high flows. Peak stream discharge typically occurs during May and June following snow melt (IDEQ 2002).

Steelhead habitat in the Secesh River population is characterized as mostly good to excellent quality (NPCC 2004, p 1-36). There are about 334 km of stream within the population with about 260 km downstream of natural barriers. Steelhead are distributed throughout the basin in the upper Secesh River, Summit Creek, Grouse Creek, and Lick Creek (Figure 5.3-34).

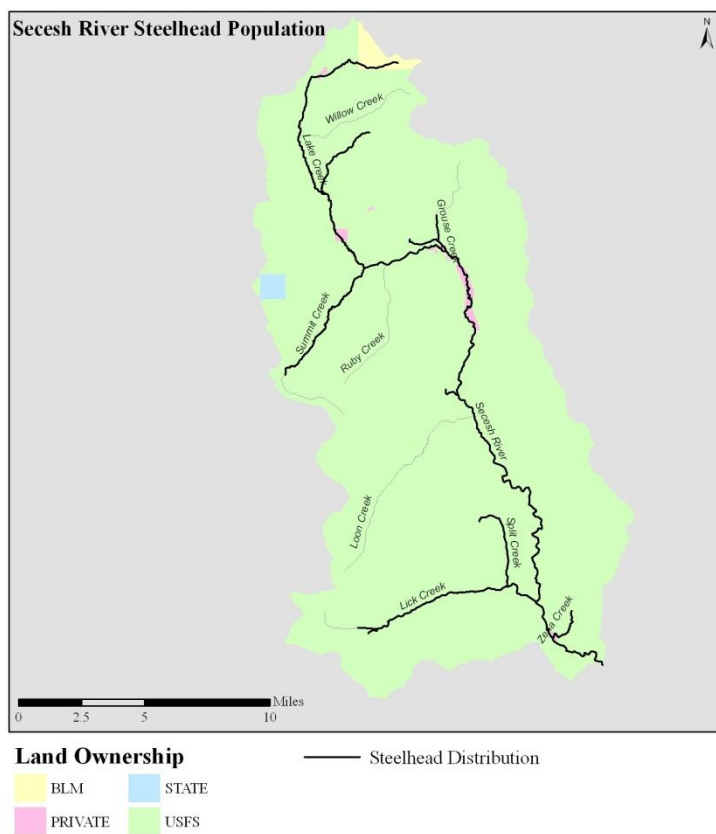


Figure 5.3-34. Land ownership pattern within the Secesh steelhead population.

Land ownership within the Secesh steelhead population is primarily USFS (98.2%) with BLM (0.8%), state (0.4%), and private (0.6%) combined at less than two percent (Figure 5.3-34). The BLM administers the Marshall Mountain Mining District in the upper Secesh River. Private land is located along the Secesh River near Grouse Creek and scattered patches upstream from Summit Creek. State owned land is concentrated in one section upstream from Summit Creek.

The alluvial deposits in and along the the Upper Secesh River were placer mined for gold in late nineteenth century and into recent years. Most activity was limited in scale. The South Fork Salmon River and its tributaries, including Johnson Creek and the Secesh River, are presently closed to recreational suction dredging due to concerns about fish habitat and water quality. Roads created for mineral exploration had few environmental considerations and were typically created for the shortest distance, easiest route, and least cost. Most of these roads currently serve

little or no purpose in relation to mineral exploration and development (USFS 2006). The problems associated with abandoned mine lands within the Secesh River drainage that might affect steelhead habitat include stream-connected surface erosion from mine exploration roads and mine access roads and potential chemical contamination of surface water from drums of unknown chemicals and abandoned equipment and machinery (USFS 2006).

A history of over utilization by sheep within the South Fork Salmon River led to a closure of many grazing allotments (IDEQ 2002). Erosion and poor vegetation recovery resulted in a reduction of sheep numbers in the 1950s. In the 1960s, the sheep market crashed and most sheep grazing ended. The allotments were shifted from sheep to cattle in the 1960s (USFS 1995). By 1970, the USFS eliminated all cattle grazing allotments in the South Fork Salmon Subbasin (USFS 1995). Currently there are four sheep grazing allotments that occur within portions of the Secesh River drainage: Victor Loon, Marshall Mtn., Bear Pete, and Josephine (USFS 2006). General use restrictions have been emplaced to limit grazing impacts to anadromous fish resources.

Timber harvest activity has been characterized for the South Fork Salmon Subbasin by IDEQ (2002). The highest volume of logging activity took place from 1950-1965 with an estimated 147 million board feet. A series of intense storms and rain-on-snow events between 1958 and 1965 created numerous landslides and slumps triggered by logging and associated road construction, inundating the South Fork Salmon River and some of its tributaries with heavy sediment loads (Platts 1972). Arnold and Lundeen (1968) in 1965 estimated that about 1.5 million cubic yards (about 7 times the normal load) of sediment was stored in the upper 59 miles of the South Fork Salmon River and its tributaries. The rain on snow events in the winter and spring of 1965 caused over 100 landslides, the majority of which were related to roads. Currently, timber management is limited to sales of utility poles, house logs, post and poles and fuel harvest. Areas in the Secesh impacted by these human activities included Zena Creek and the area near Lake Creek in the Upper Secesh watershed. The 1950s and 1960s were the busiest in terms of timber harvest and road construction. Mining activities were most intense in the 1940s and grazing impacts were greatest in the 1920s (IDEQ 2002).

The IDEQ developed a list of impaired waters across the state of Idaho to comply with section 303(d) of the Clean Water Act. IDEQ's 2008 Integrated 303(d)/305(b) Report includes stream segments listed under section 5 (303d streams), section 4c (waters impaired by non-pollutants), and section 4a (EPA approved TMDLs) (IDEQ 2009). IDEQ (2009) does not currently list any stream segments in the Secesh steelhead population as water quality impaired.

Current Habitat Limiting Factors: NMFS determined the habitat limiting factors by reviewing multiple data sources and reports on stream conditions. Based on reports and discussions with local fisheries experts and watershed groups, NMFS conclude that the habitat limiting factors for the Secesh steelhead population are excess sediment and degraded riparian conditions. Table 5.3-37 summarizes the mechanisms by which each limiting factor affects steelhead, and the management objectives for addressing each limiting factor. A discussion of each limiting factor follows using information from USFS reports, IDEQ reports, and the Salmon Subbasin Assessment and Management Plan (USFS 2006; IDEQ 2002, 2009; NPCC 2004; Ecovista 2004).

Table 5.3-37. Primary limiting factors identified for the Secesh River steelhead population, mechanisms by which each limiting factor affects salmonids, and management objectives for addressing each limiting factor.

Limiting Factors	Effects on Steelhead	Management Objectives to Address Limiting Factors
Sediment	Excess sediments can reduce juvenile habitat (rearing), aquatic insect availability (food), and spawning and incubation success (reproduction).	Riparian restoration actions to stabilize streambanks and reduce sedimentation to the stream and road improvement and rehabilitation to reduce sediment delivery to streams.
Riparian Conditions	Poor riparian conditions reduce habitat quality, streambank stability (sediment and channel condition), shade (stream temperature), and large woody debris recruitment (habitat complexity and pool formation).	Riparian restoration actions to increase habitat complexity and LWD recruitment.

1. Excess Sediment.

Sediment in the Secesh River watershed has a moderate influence on habitat quality (NPCC 2004, p. 3-33). As reported by the USFS (2006), fine sediments have consistently been lower in the Lake Creek and Secesh River spawning areas than in the mainstem upper South Fork Salmon River spawning

areas, except for the anomalous Threemile Creek site that continues to be influenced nearby unconsolidated mine spoils. The Threemile Creek site is functioning at risk and near functioning at unacceptable risk for intragravel fine sediments. Intragravel conditions at other Secesh monitoring sites appear to provide habitat with the potential for high salmon and steelhead embryo survival (USFS 2006). Conditions at the Threemile Creek site are unlikely to improve without stabilization of the finer mine tailings, but their influence appears to be restricted to a relatively small area.

2. Degraded Riparian Conditions.

Some evidence suggests that riparian conditions in the Secesh River may be reducing population abundance and productivity through changes in habitat quality, whereas other evidence suggests that riparian conditions are in relatively good shape.

The NPCC (2004, p. 3-33) reported reduced shade from riparian areas as the greatest influence on habitat quality within the Secesh River watershed. Roads and mining activities have disturbed riparian areas, reducing shade along some stream reaches. The USFS (2006) reported a total road density of 1 mile/sq. mile for the Secesh analysis area with a concentration (1.5 miles/sq. mile) within riparian conservation areas. This equated to about 16 percent of roads falling in riparian conservation areas, disturbing riparian habitat. However, other indicators related to a functioning riparian zone such as pool frequency, pool quality, and streambank stability were considered to be functioning appropriately, and LWD was considered to be functioning at risk (USFS 2006). The USFS (2006) also noted that stream temperature values were within the functioning-at-risk to functioning-at-unacceptable-risk range. However, stream temperatures were considered to reflect a natural temperature regime because there is little evidence of land management effects on stream temperature except along the mainstem roads where shade is reduced.

Summary of Current Habitat Limiting Factors and Threats

Habitat limiting factors in the Secesh River steelhead population are linked to human induced disturbances such as mining and road building. The inherently fragile parent geology combined with human disturbances and occasional heavy precipitation makes the basin susceptible to large sediment producing events that degrade habitat quality for steelhead. Roads located near streams limit stream shade and potential sources of large woody debris. Priorities for addressing limiting factors in the Secesh steelhead population should be mitigation and elimination of sediment inputs from human caused disturbances and restoration efforts to improve riparian conditions to enhance riparian shade and habitat quality (LWD). Restoration of riparian areas, elimination of sediment inputs, and improvements to habitat quality may require road obliteration, realignment, conversion or closure. Elimination of potential hazardous materials at abandoned mine sites (drums of unknown chemicals) should be evaluated to prevent soil and water contamination.

Potential Habitat Limiting Factors and Threats: Several potential concerns have not yet risen to the level of limiting factors, but need to be managed to protect habitat in the Secesh River population area.

1. Degraded habitat due to residential development — An area of Secesh Meadows adjacent to spawning and rearing habitat is currently being developed into a subdivision (USDA 2003a). Without sufficient planning, development could degrade the ecological function and ability of the meadows to support steelhead.

2. Degraded habitat due to recreational use — The Secesh River watershed is becoming a popular destination for dispersed recreation, providing opportunities for hunting, fishing, ATV use, motorcycling, snowmobiling, hiking, skiing, mountain biking, and camping (USDA 2003a, p. III-232). The increasing level of recreational ATV use is becoming a primary concern in the watershed, leading to additional vegetation loss and ground disturbance (Wagoner and Burns 2003, p. 44), which could lead to increased sediment delivery to streams.

3. Degraded habitat from noxious weeds — A number of noxious weeds and exotic plants have been introduced into the watershed, particularly along the main travel ways. Noxious weeds can increase soil erosion and decrease native plant density.

Hatchery Programs

[To be developed]

Harvest Management

[To be developed]

Recovery Strategies and Actions

The recovery strategies that address a limiting factor may include both short-term and long-term actions. Short-term actions are projects scheduled to be implemented within the next ten years by a resource management agency or local stakeholder group. Long-term actions are categories of actions that could increase productivity for the population, but for which a specific project has not yet been proposed by a resource management agency or other stakeholder.

Natal Habitat Recovery Strategy and Actions

Priority stream reaches: The priority stream reaches for habitat actions are reaches with intrinsic potential in the population's major spawning area, the Upper Secesh River above Enos Creek, and the minor spawning area, Lick Creek (Figure 5.3-32). Addressing limiting factors within these areas should focus on habitat protection, potential sources of sediment, and restoration of riparian habitat.

Habitat actions: The following priority habitat actions are intended to improve productivity rates and increase the effective capacity for natural smolt production in the watershed. Emphasis on reduction and stabilization of disturbed areas will improve watershed conditions while protection of intact areas will prevent further disturbances.

1. Road improvement and rehabilitation to reduce sediment delivery to streams.
2. Reclamation or rehabilitation of abandoned mine sites to reduce sediment delivery to streams.

Implementation of Habitat Actions

Implementation of habitat actions for this population will likely occur through the work of the USFS, IDFG, IDEQ, Nez Perce Tribe, and county soil and water conservation districts. Between these groups there is an excellent representation of tribal, local, state, and federal entities that manage land and other resources within the watershed. These groups have a record of implementing salmon conservation projects and programs in this drainage and in other areas within the state. Table 5.3-38 identifies

limiting factors, proposed actions, priority locations, short-term projects and associated costs for recovery of the Secesh River steelhead population.

Many habitat restoration projects have already been completed in the Secesh River drainage. NPCC (2004) identified 83 projects directed at improving fish and wildlife habitat in the South Fork Salmon River drainage, a portion of which were located in the Secesh River drainage. The IDEQ (2002) listed numerous projects that were developed to reduce sediment input in Secesh River drainage, including graveling roads and other road improvements. Wagoner and Burns (2001) identified several Payette National Forest projects in the watershed aimed at reducing sediment delivery and creating fish passage. These projects included road graveling, road decommissioning, and a replacement of a Grouse Creek culvert with a bridge.

Habitat Cost Estimate for Recovery

While no short-term projects are currently funded for the Secesh River steelhead population, the Nez Perce Tribe is seeking funding for the projects described in Table 5.3-38. The estimated costs of the projects in Table 5.3-38 is \$305,000. The estimates are based on average costs from other Nez Perce Tribal projects. These projects are also identified in the South Fork Salmon River spring/summer Chinook MPG Chapter (Section 4.2) and should not be double counted.

Hatchery Recovery Strategy and Actions

[to be added]

Harvest Recovery Strategy and Actions

[to be added]

Table 5.3-38. Recovery Actions Identified for the Secesh River Steelhead Population.

Recovery Actions Identified for the Secesh River Steelhead Population.						
Natal Habitat Recovery Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020
Secesh River Watershed	Sediment	Road decommissioning or rehabilitation, riparian enhancement.	The proposed South Fork Salmon River project covers the entire South Fork Salmon River subbasin and would include approximately 15 miles of road decommissioning or improvement, 1 fish passage improvement (e.g. culvert removal/replacement), and 20 acres of weed management activities, soil restoration, and/or riparian restoration per year. Some of these projects may occur in the Secesh River drainage.	15 miles @ 15,000 = \$225,000 1 culvert @ \$60,000 20 acres of weed treatment @ \$1,000 = \$20,000 [Costs are also identified in Section 4.2.]	None identified	\$0
Hatchery Recovery Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020
Harvest Recovery Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020

5.3.6.9 North Fork Salmon River Steelhead Population

Abstract/Overview

The North Fork Salmon River population is tentatively rated at moderate risk because the surrogate population for A-run steelhead passing Lower Granite Dam is at moderate risk, based on recent abundance and productivity. The population is targeted to achieve the desired status of Maintained, which requires no more than moderate abundance/productivity risk.

Current Status	Desired Status
Maintained	Maintained

The desired status for the North Fork Salmon River population suggests that no recovery plan actions directed specifically at this population are necessary. However, a conservative management approach should be pursued until population-specific data become available to more accurately describe the status of this population. Recovery actions in the Snake and Columbia Rivers migration corridor, and spawning and rearing habitat actions aimed primarily at spring/summer Chinook, will further reduce the risk for this population.

While current best available information indicates that this population has achieved its desired status, there is a high degree of uncertainty in estimating the population's current status, as well as the nature and timing of the population's response to various recovery strategies. Due to this uncertainty, it is important to use an adaptive management strategy, in conjunction with the ESA's five-year status reviews and the information in the Research, Monitoring, and Evaluation chapter. If new information shows that this population has not achieved its desired status, it is imperative to identify those actions that are most likely to yield additional improvement.

Introduction

This section of the recovery plan compares the population's desired status to its current status, and describes how the population fits into the recovery strategy for the MPG and DPS. The primary sources of information are the ICTRT viability criteria (NMFS 2007b) and the ICTRT's Snake River steelhead status assessment (ICTRT 2008).

Population Status

The Population Status section describes the population's current status as defined in the ICTRT's most current status assessment (ICTRT 2008) where they discussed risk in terms of four viability parameters: Abundance, Productivity, Spatial Structure and Diversity. Other available information was also considered. The section focuses primarily on population Abundance (the total number of adults) and Productivity (the ratio of returning adults to the parental spawning adults). It compares the population's current status to the desired status in terms of both abundance and productivity. It also summarizes Spatial Structure (the amount and nature of available habitat) and Diversity (genetic traits) concerns identified by the ICTRT. Diversity concerns are also discussed in the hatchery section. More details are available in the Snake River steelhead status assessment (ICTRT 2008).

Population Description: The North Fork Salmon River steelhead population includes the North Fork Salmon River and the Salmon River and its tributaries from the North Fork downstream to Panther Creek. Besides the North Fork itself, Indian Creek is the most important tributary in this steelhead

population. The ICTRT (2003) designated this population based primarily on the geographic distance of the primary spawning areas from other spawning aggregates, and on basin topography.

The current steelhead distribution in the North Fork Salmon River watershed is known largely through juvenile surveys. A NMFS model of potential habitat, based on geomorphological characteristics, suggests that the historic distribution of steelhead could have included much of the North Fork Salmon watershed, Indian Creek, and several tributaries draining into the Salmon River (NMFS 2006) (Figure 5.3-35). Current distribution defined by local agencies appears similar to this historic estimate. In the North Fork watershed, current steelhead distribution includes Hughes, Hull, Twin, Pierce, Dahlenega, and Sheep Creeks, as well as the North Fork mainstem. For tributaries draining into the Salmon River, current distribution includes Pine, Spring, Moose, Squaw, and Indian Creeks.

The North Fork Salmon River population is an A-run population. Hatchery A-run steelhead of Hells Canyon stock were released into the North Fork between 1977 and 1994.

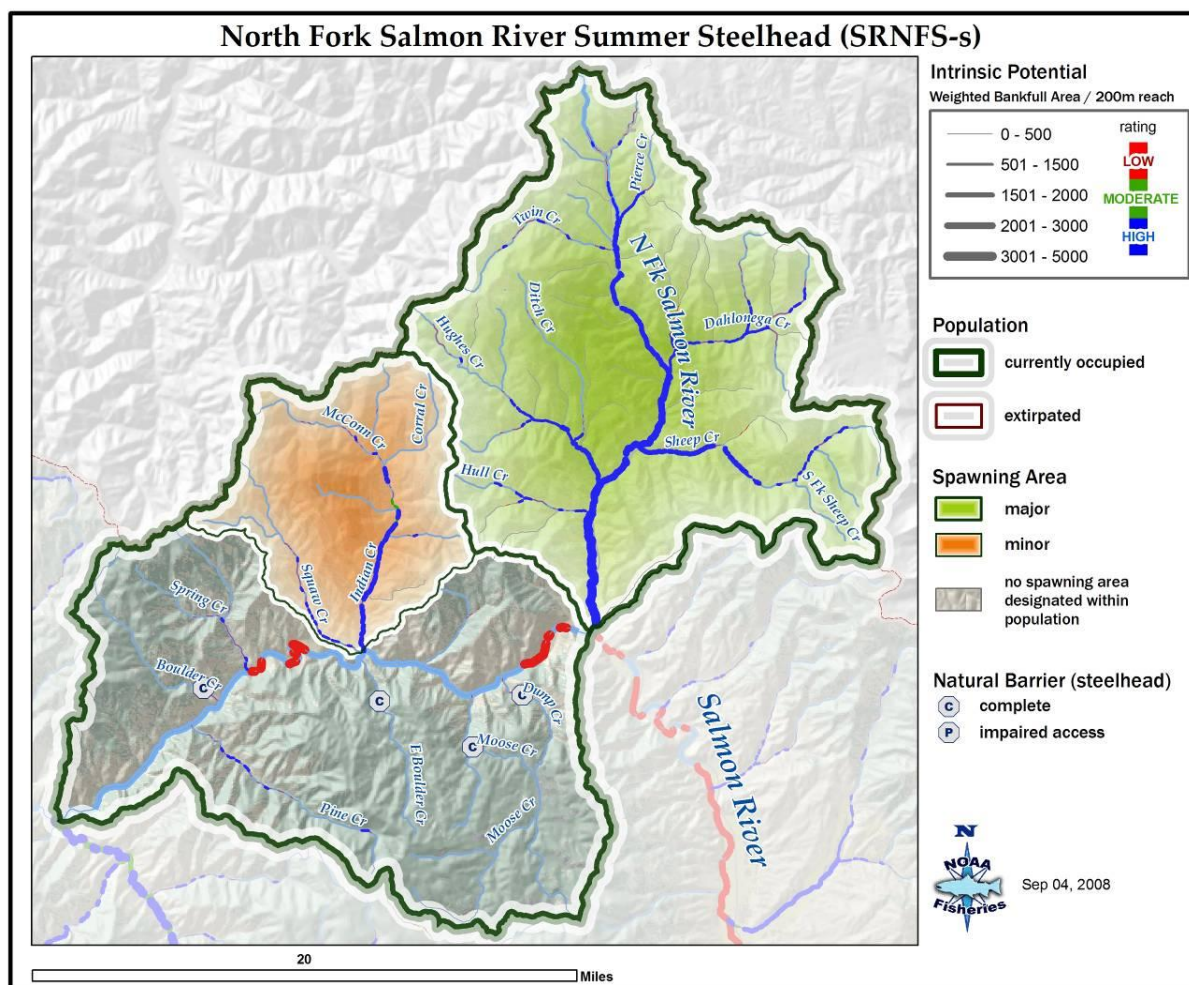


Figure 5.3-35. North Fork Salmon River steelhead population, with major and minor spawning areas.

The ICTRT classified the North Fork Salmon population as “basic” in size and complexity based on historical habitat potential (ICTRT 2007). A steelhead population classified as basic has a mean

minimum abundance threshold of 500 natural-origin spawners with sufficient intrinsic productivity to achieve a 5 percent or less risk of extinction over a 100-year timeframe. In order for the North Fork population to achieve a 25 percent or less risk (“moderate risk”) of extinction over 100 years, abundance and productivity targets are somewhat lower.

Abundance and Productivity: Most Snake River steelhead populations (including all of the Idaho populations) do not have direct estimates of annual spawning escapements. The ICTRT generated preliminary estimates of average population abundance and productivity for these Snake River populations using annual counts of wild steelhead passing Lower Granite Dam. Estimates were developed for two average surrogate populations to represent both major run types (A and B). These abundance and productivity estimates were then compared to a viability curve for an intermediate-sized Snake River steelhead population (requiring a minimum abundance threshold of 1,000 natural-origin spawners and a productivity of 1.14 recruits per spawner).

The surrogate population for A-run steelhead above Lower Granite Dam has an estimated recent abundance of 556 and productivity of 1.86. It is rated as Moderate Risk based on current abundance and productivity, as shown in Figure 5.3-36 (25% or less risk of extinction over a 100-year timeframe). Although the current estimate of intrinsic productivity is above the minimum threshold for low risk, the current average natural abundance (recent 10-year geometric mean) is well below the ICTRT minimum threshold value of 1,000. More specific information about how the abundance and productivity estimates were calculated is included in the ICTRT’s steelhead status assessment Appendix B-1 *Calculating Representative Abundance and Productivity Estimates for Snake River A and B run Steelhead Populations*.

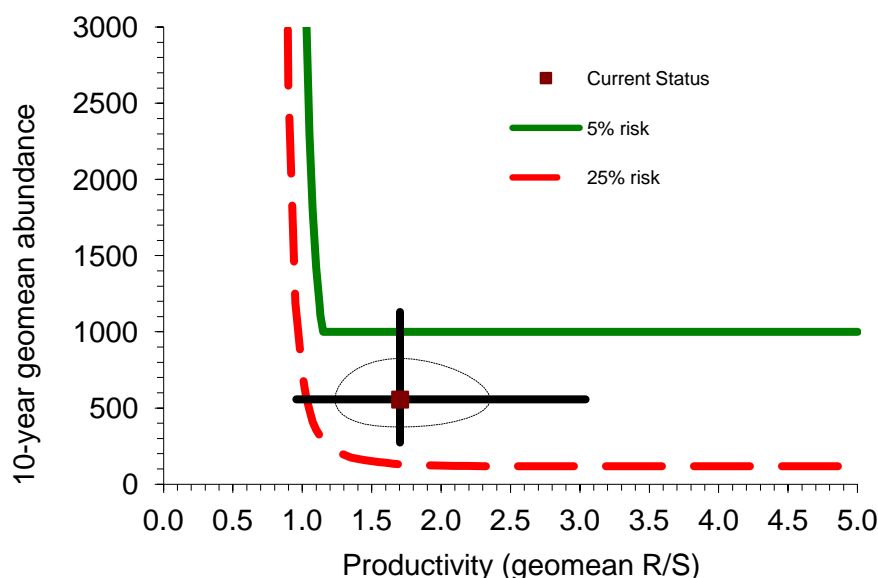


Figure 5.3-36. Snake River A-run surrogate steelhead population current estimated abundance and productivity (A/P) compared to DPS viability curve (1986-2005). Ellipse = 1 SE about the point estimate. Error bars = 90% CI for A, 98% CI for P (if point estimate >1% risk curve, the uncertainty test is <1% probability the combined A/P is at high risk).

Based on the surrogate A-run population, the ICTRT gave this population a tentative abundance/productivity rating of moderate risk.

Spatial Structure: The ICTRT has identified one major spawning area (North Fork) and one minor spawning area (Indian Creek) within the North Fork Salmon River steelhead population, and this limited spatial structure creates an inherent extinction risk. However, because both historic spawning areas are currently occupied, the cumulative spatial structure risk is low, which is sufficient for this population to reach its desired status.

Diversity: The diversity risk for this population is largely driven by the occurrence of hatchery fish spawning in the population, from past direct releases of hatchery steelhead into the North Fork and from ongoing potential straying of hatchery steelhead returning to the upper Salmon River.

Hatchery A-run steelhead were released into the North Fork every year from 1977-1994, except 1992. It is assumed that all smolt releases were Pahsimeroi Hatchery A-run stock, which was derived primarily from Hells Canyon Snake River stock. In some years, natural spawners could have consisted of greater than 80 percent recruits from hatchery smolt releases. However, genetic analysis of the population has shown no similarity to hatchery samples.

Hatchery steelhead are currently released at numerous locations in the upper Salmon River for harvest augmentation. Current releases of hatchery smolts in the vicinity of the North Fork Salmon River are Pahsimeroi Hatchery A-run stock, which was derived from Hells Canyon stock. Some returning hatchery fish are not harvested in fisheries and do not recruit back to weirs or traps, and are thus assumed to be spawning naturally. The number and proportion of natural spawners in the North Fork Salmon River population that are from proximate mainstem Salmon River hatchery releases, or from release points upstream of this population, are unknown.

The past hatchery and the potentially high proportion of hatchery-origin spawners straying into the North Fork and other Salmon River tributaries contribute to a cumulative moderate diversity risk for the population. A moderate diversity risk is adequate for the population to reach its desired status.

Summary: The North Fork steelhead population is currently at moderate risk due to a tentative moderate risk rating for abundance/productivity and a moderate risk rating for diversity. A population-specific monitoring program is necessary to reduce the uncertainty of this rating. Table 5.3-39 shows the population's current and desired status (both maintained) in terms of cumulative abundance/productivity and spatial structure/diversity risks. A complete version of the ICTRT's draft status assessment for Snake River Basin steelhead populations is available upon request from the NMFS.

Table 5.3-39. North Fork population risk ratings integrated across the four viable salmonid population metrics.

		Spatial Structure/Diversity Risk			
		Very Low	Low	Moderate	High
Abundance/ Productivity Risk	Very Low (<1%)	HV	HV	V	M
	Low (1-5%)	V	V	V	M
	Moderate (6 – 25%)	M	M	M North Fork	HR
	High (>25%)	HR	HR	HR	HR

Viability Key: HV – Highly Viable, V – Viable, M – Maintained, and HR – High Risk; shaded cells – do not meet viability criteria, with darkest cells signifying the highest risk of extinction. Percentages refer to risk of extinction over 100 years. Arrow points to desired risk status.

Estimates indicate that this population is currently meeting its desired status of maintained, so no recovery plan actions are directed specifically at the population at this time. However, the following sections on limiting factors and recovery strategies are included for several reasons. Considerable uncertainty is involved in achieving the desired status for all of the populations within the Salmon River MPG, so further reducing the risk status for the North Fork population could provide flexibility for meeting the delisting goal for the MPG. Due to lack of population-specific abundance and productivity data, there is also uncertainty associated with the conclusion that the North Fork population is currently meeting its desired status. Finally, further reducing the extinction risk for this population could be necessary for meeting goals beyond compliance with the Endangered Species Act, such as additional harvest of the state of Idaho or interested tribes.

Limiting Factors and Threats Specific to Population

This section describes the limiting factors and threats that are specific for the population. The population is also affected by limiting factors and threats in the mainstem Columbia/Snake River corridor, estuary, and plume, and by climate change. Section 5.1.1 summarizes regional-level factors that affect all Idaho Snake River steelhead populations.

Natal Habitat

Habitat Conditions: The North Fork Salmon River population is located along the Idaho-Montana border and includes the North Fork Salmon River watershed and all tributaries downstream to the confluence of Panther Creek. The population geographic boundary drains approximately 483 square miles. The climate of the Salmon River basin is highly variable, but near Salmon, Idaho the average annual precipitation is about 10 inches mostly falling as snow during the winter and early spring. The weather for the region is characterized by warm summers and cool or mild winters.

Land ownership within the population is mostly USFS (97.8%). Private (2.1%) and state of Idaho (<1%) lands make up a very small portion of ownership in the population. The Salmon-Challis

National Forest administers most of the land within the population boundaries, but private inholdings are located along many streams (Figure 5.3-37). Public lands are used for livestock grazing, timber, recreation, and a variety of other public uses. Private land management is mostly irrigated agriculture and livestock grazing in the valley bottom. Past human activities including mining, timber harvest, livestock grazing, and development have impacted this habitat for at least the last 130 years. At one time, hydraulic gold mining in the Gibbonsville area produced high levels of turbidity in the North Fork and delivered large amounts of fine sediment to stream channels. Livestock grazing allotments occur within the Hughes Creek and Hull Creek drainages, but impacts from these activities have been declining (IDEQ 2001).

IDEQ's 2008 Integrated 303(d)/305(b) Report includes stream segments listed under the Clean Water Act, section 5 (303d streams), section 4c (waters impaired by non-pollutants), and section 4a (EPA approved TMDLs) (IDEQ 2009). Only one stream segment in the population is listed as impaired—Dump Creek, listed for sediment along 5.04 miles (Figure 5.3-38). Dump Creek has a natural barrier in the lower section that prevents upstream steelhead migration. In other locations sediment levels monitored with core sampling were variable, but most were functioning properly for quartzite parent geology (USFS 2010).

Current Habitat Limiting Factors: NMFS determined the habitat limiting factors by reviewing multiple data sources and reports on stream conditions. Based on reports and discussions with local fisheries experts and watershed groups, NMFS conclude that the key habitat limiting factors for this population are lack of habitat complexity/riparian conditions, low stream flow, entrainment in unscreened irrigation diversions and migration barriers.

Table 5.3-40 summarizes the mechanisms by which each limiting factor affects steelhead, and the management objectives for addressing each limiting factor. The following section discusses each limiting factor using information from IDEQ reports, USFS habitat assessments, and the Salmon Subbasin Assessment and Management Plan (USDA 2000, 2007; IDEQ 2009; ISSC 1995; NPCC 2004; Ecovista 2004).

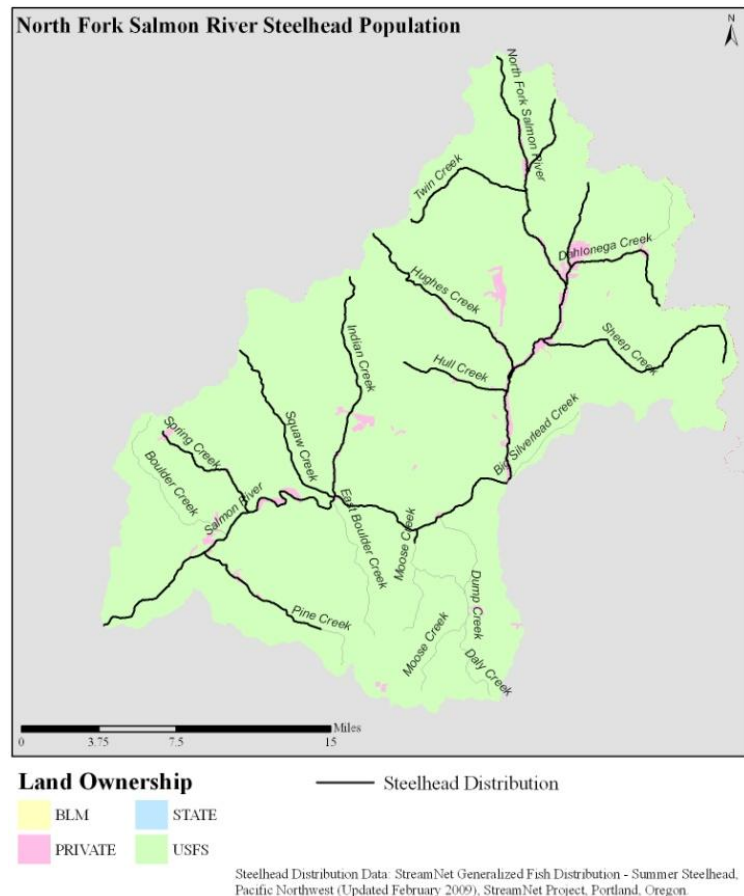


Figure 5.3-37. Land ownership in the North Fork Salmon River steelhead population.

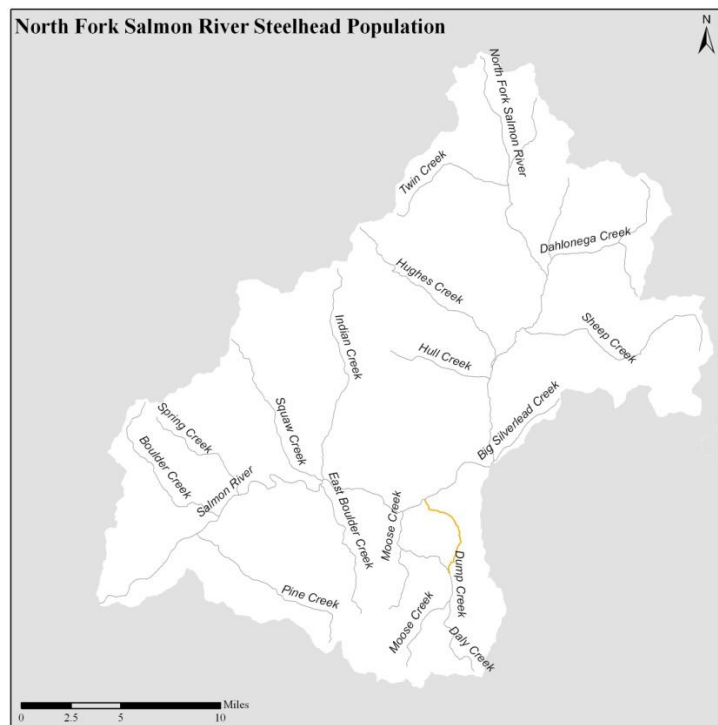
Table 5.3-40. Primary limiting factors identified for the North Fork steelhead population, mechanisms by which each limiting factor affects salmonids, and management objectives for addressing each limiting factor.

Limiting Factors	Effects on Salmonids	Management Objectives to Address Limiting Factors
Habitat Complexity	Reduced habitat complexity from lack of sufficient LWD reduces pools formation juvenile rearing and adult holding.	Riparian restoration to increase habitat complexity and LWD recruitment.
Stream Flow	Low stream flows reduce available habitat, can exacerbate high stream temperature conditions, and in extreme conditions can create barriers to migrations or movement (dry stream channels).	Water quantity restoration actions to improve instream flow and stream connectivity.
Migration Barriers	Migration barriers such as dams, culverts, and dewatered stream sections can create fish passage barriers. These barriers reduce or eliminate movement of adult and juvenile salmon within a watershed ultimately reducing potential spawning and rearing habitat.	Correction or removal fish passage barriers.
Entrainment	Juvenile fish entrainment occurs through unscreened irrigation diversions. Young salmon are at risk when they are diverted into canals or diversion ditches.	Eliminate entrainment through actions that prevent the loss of fish in irrigation diversion systems.

1. *Loss of Habitat Complexity.*

Past land use has drastically reduced habitat complexity and pool frequency in the North Fork population by removing riparian vegetation and altering LWD recruitment processes (USFS 2000). Current human activities may be further reducing LWD in stream channels.

While surveying the North Fork Salmon River channel in the 1990s, the Salmon-Challis National Forest and IDFG observed a significant reduction in the amount and quality of rearing habitat associated with deep pools and the amount and quality of spawning habitat. The biologists concluded that a major factor in this reduction was loss of LWD (USFS 2005). Current highway maintenance and private land practices remove LWD and debris jams from the stream channels, particularly the North Fork mainstem, in order to reduce the risk to the numerous bridges crossing the river. This loss of LWD has lead to loss of pool habitat (USFS 2007). Furthermore, without LWD to reduce stream flow velocities, gravel and small



303(d) List
— Sediment

Data: Idaho Department of Environmental Quality. Idaho 2008 305(b) 303(d) Integrated Report (Final).

Figure 5.3-38. Impaired stream reaches in the North Fork Salmon River steelhead population (IDEQ 2009).

cobbles are more likely to be washed downstream during high flows. The Salmon-Challis National Forest has observed a change in substrate from gravel and small cobbles to large cobbles and boulders in the North Fork and a simultaneous reduction in suitable spawning habitat (USFS 2005).

Stream restoration projects have increased habitat complexity in individual stream reaches in Indian Creek and the North Fork by placing logs and boulders. The Salmon-Challis National Forest is currently planning another wood placement project, this one in Hughes Creek. Many more stream miles in the population are currently limited by lack of habitat complexity and LWD, such that future projects could continue to incrementally increase abundance and productivity for steelhead. In addition, grazing, road-building, and hydraulic mining have all removed riparian vegetation and led to widespread bank instability (USFS 2000). Bank instability can cause wide, shallow channels that do not provide quality rearing habitat due to lack of cover and the potential for high temperatures. Where bank instability is impacting roads or private property, bank stabilization projects (e.g. riprap) are common. Although individual projects may address local chronically eroding streambanks, the cumulative effects of bank hardening throughout a watershed can lead to increased erosion. The addition of riprap prevents stream lateral migration and modifies hydraulic regimes by transferring hydraulic energy which can lead to increased erosion on opposite streambanks downstream. With certain hardening treatments, nearshore topography is scoured, fish habitats can be degraded or destroyed, riparian habitat can be lost, and erosion of downstream streambanks can be accelerated (WDFW et. al. 2002).

2. Low Streamflow during Critical Periods.

Low streamflows reduce available habitat, can exacerbate high stream temperature conditions, and in extreme conditions can create barriers to migrations or movement. The effects of altered streamflows on steelhead due to irrigation withdrawals are most likely to influence the quantity and quality of juveniles rearing habitat. Growth and survival of juvenile salmonids can be related to streamflow, and reduced streamflow can lead to decreased food availability (Nislow et al. 2004, Harvey et al. 2006). Juvenile salmonids generally stay close to escape cover, and as flow decreases, availability of escape cover also decreases (Hardy et al. 2006, Holecek et al. 2009). The numerous water withdrawals in the North Fork population area may be limiting this population's abundance and productivity by reducing the availability and quality of juvenile habitat.

Irrigation in the North Fork population occurs on strips of private land along narrow stream valleys where ranchers grow alfalfa and hay or maintain pasture. While irrigation diversions are scattered throughout the population, diversions in the North Fork and Indian Creek drainages have the most potential to affect the population (Figure 5.3-39). In the North Fork drainage, irrigation diversions are known to cause reduced flows in Dahlenega Creek, Hughes Creek, and Hull Creek (USFS 2000). The effects of water withdrawals on North Fork salmonids have not been studied as thoroughly as in neighboring populations like the Lemhi River and Pahsimeroi River, which both have broad valleys with much greater amounts of irrigation. Within the North Fork population, the extent of irrigation is constrained by lack of arable land due to narrower valleys. Nonetheless, water rights exist for a cumulative 52.5 cfs of water to be diverted from the North Fork Salmon River drainage (IDWR 2008). In contrast, the USGS (Hortness and Berenbrock 2001) estimates that in the absence of irrigation diversions, August flow at the mouth of the North Fork Salmon River would exceed 28 cfs only 20 percent of the time, suggesting that irrigation diversions could substantially reduce summer flows within the watershed. On the other hand, Idaho Power reports mean measured August flows of 50.2 cfs, 53.1 cfs, and 39.7 cfs in 2005, 2006, and 2007 respectively (Idaho Power 2009). These measured

flows during the irrigation season are of the same magnitude as the USGS's modeled unimpaired baseflows, suggesting a smaller impact to flows from irrigation diversions. The apparent conflict between these different sources of information could come from multiple factors, such as the high level of uncertainty associated with the USGS modeled unimpaired flow estimates or the possibility that irrigators may divert less stream flow than the water right maximums. Lack of long-term data on streamflow or irrigation diversions makes it difficult to quantify the effects of streamflow impairments on salmonids within the North Fork Salmon River watershed.

Water withdrawals may also be limiting steelhead habitat in Indian Creek. Water rights exist for a cumulative 2.5 cfs of stream flow in the watershed, compared to an estimated unimpaired August base flow that exceeds 7.4 cfs only 20 percent of the time (Hortness and Berenbrock 2001), suggesting the

potential for substantial streamflow reductions. In 2002 the Lemhi County Soil and Water Conservation District completed a project to consolidate diversions on Indian Creek in order remove passage barriers created by the old diversions and divert less water overall, enhancing instream flows (USBWP 2009). Again, because of lack of measurements on actual streamflow or water withdrawals, it is difficult to quantify the effects of streamflow impairments on steelhead habitat in this drainage.

Watershed reports show that reduced streamflow is limiting available habitat in a few specific tributary streams like Dahlenega Creek and Hughes Creek in the North Fork drainage (USFS 2000). The available data are inconclusive on whether reduced flows are also impairing habitat in the North Fork mainstem or in Indian Creek. However, the large number of irrigation water rights relative to summer streamflow levels in both these drainages means that there is potential for habitat impairment. As described above, reduced streamflow can limit juvenile habitat by leading to increased water temperatures, by reducing the volume of available rearing habitat, or by blocking passage between stream reaches. Recent temperature monitoring has not shown elevated stream temperatures, but this remains a possible effect from reduced flows (USFS 2007). Reductions in available habitat and barriers to habitat, on the other hand, are likely currently reducing the abundance and productivity of

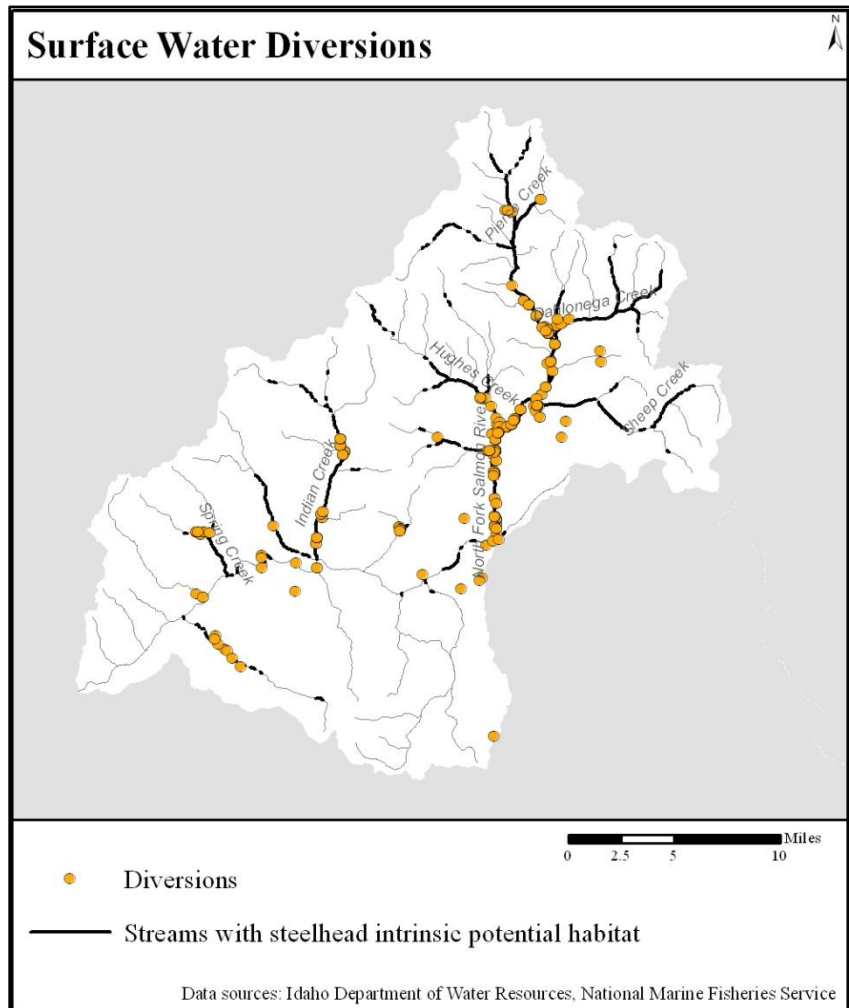


Figure 5.3-39. Location of surface water diversions within the North Fork steelhead population.

this population. Very few restoration projects have so far addressed this limiting factor within the North Fork population.

3. Entrainment.

Unscreened irrigation diversions pose a threat to rearing streams in multiple streams in the population, particularly Dahlenoga Creek, Hughes Creek, and Hull Creek in the North Fork watershed (USFS 2000). Without screens, steelhead may enter diversions and become trapped. Many diversions on the mainstem North Fork Salmon River are now screened, but diversions throughout the rest of the population remain unscreened (IDFG, unpublished data). As depicted Figure 5.3-38, the number of irrigation withdrawals indicates that the risk of entrainment is present throughout much of the population. The Upper Salmon Basin Watershed Project and IDFG are working with landowners to screen diversions.

4. Migration Barriers.

The Salmon Subbasin Assessment reports that multiple barriers to fish migration exist in tributaries to the mainstem Salmon River within the North Fork Salmon River population boundaries (NPCC 2004). These tributaries are generally more important for steelhead than for Chinook salmon. During the reconstruction of Highway 93, numerous culverts that were previously fish migration barriers were replaced with larger culverts that improved fish migration. Rehabilitating culverts in Twin and Sheep Creeks has also improved connectivity within the North Fork Salmon River drainage (SCNF, 1993 from IDEQ 2001).

Currently, there are man-made physical barriers (culverts and diversion dams) on both public and private lands that may affect this steelhead population. There are four fish migration barriers caused by culverts in the Hughes Creek drainage. Three of these culverts are in the engineering design phase and scheduled to be replaced with fish passable structures within the next five years, depending upon funding (USFS 2010). A diversion dam on private land in Hull Creek creates a complete migration barrier to upstream fish passage. The diversion also leads to intermittent to subsurface flow for approximately 1.2 miles on Hull Creek. There is one partial migration barrier culvert in lower Hull Creek. This culvert may not be a total barrier to fish passage, but it impedes upstream juvenile fish migration during low flows. During high flows, the culvert may also impede upstream fish passage for adult salmonids. Seven culverts on USFS roads in the North Fork drainage limit fish movement. These culverts are located in Anderson Creek, Hammerean Creek, Johnson Gulch, Smithy Creek and Threemile Creek. Anderson Creek and Threemile Creek have intrinsic potential steelhead habitat. An unscreened ditch with a diversion dam also exists on private land on Anderson Creek, preventing fish from moving upstream and entraining fish in the unscreened ditch (USFS 2004). There are man-made physical barriers (culverts and diversion dams) within Indian Creek on both public and private lands. There are five fish migration barrier culverts in the Sage Creek drainage. However, Sage Creek is a very small high gradient mountain stream that only supports a westslope cutthroat trout population.

Summary of Current Habitat Limiting Factors and Threats

Based on the information compiled above, NMFS concludes that the key habitat limiting factors for the North Fork Salmon River population are lack of habitat complexity, reduced streamflow, and entrainment in ditches. Development along the North Fork River corridor further threatens habitat quality and may lead to limiting factors in the near future. Impassable culverts and elevated fine sediment loads exist within the population boundaries.

Potential Habitat Limiting Factors and Threats: One potential concern has not yet risen to the level of a limiting factor, but should be managed to protect steelhead habitat in the North Fork Salmon River population area and allow any degraded habitat to recover.

1. Loss of habitat quality due to rural development. Rural development along the mainstem North Fork Salmon River poses a threat to habitat quality for steelhead. Development, and particularly bridges crossing the river to reach home sites, can lead to bank instability and loss of riparian vegetation. A study on development in Lemhi County, commissioned by Salmon Valley Stewardship, ranked almost all private land along the North Fork Salmon River as being high priority for development, based on the suitability for housing sites and relatively low agricultural potential of the land (Spatial Dynamics 2006). Housing development along the mainstem North Fork Salmon River is likely to continue, potentially leading to further bank instability and removal of riparian vegetation and an increase in riprap. These changes to the riparian zone could degrade habitat quality, such as by leading to wider stream channels with less cover for juvenile salmonids and with higher stream temperatures.

Local efforts to reduce this threat to stream habitat are ongoing. Lemhi County is developing a Comprehensive Plan and Growth Management Plan with riparian setbacks. The Nature Conservancy and Salmon Valley Stewardship are working with private landowners to educate them and to develop conservation easement agreements. NMFS recommends land-owner education programs to encourage landowners to retain vegetation along the river and minimize the effects of bridges.

Hatchery Programs

[To be developed]

Harvest Management

[To be developed]

Recovery Strategies and Actions

The recovery strategies that address a limiting factor may include both short-term and long-term actions. Short-term actions are projects scheduled to be implemented within the next ten years by a resource management agency or local stakeholder group. Long-term actions are categories of actions that could increase productivity for the population, but for which a specific project has not yet been proposed by a resource management agency or other stakeholder.

Natal Habitat Recovery Strategy and Actions

Priority stream reaches: Within the North Fork population, the priority drainages for habitat actions are the population's one major spawning area, the North Fork, and the population's one minor spawning area, Indian Creek. Within these drainages, priority streams are those that have been ranked by the Upper Salmon Basin Technical Team as Priority I and also have modeled intrinsic potential for steelhead spawning and rearing (Figure 5.3-40).

The Upper Salmon Basin Technical Team prioritized the streams for salmonid habitat restoration in a report titled *Screening and Habitat Prioritization for the Upper Salmon Subbasin (SHIPUSS)* (USBWP 2005). The SHIPUSS report prioritized stream reaches based on a scoring system that considered

stream connectivity, stream size, and habitat and fisheries information on a weighted basis. Under SHIPUSS, Priority I streams are those streams that have the potential to realize immediate, tangible benefits to fish if recovery efforts are directed toward them. Priority II streams are those streams that will also see tangible benefits to fish as a consequence of recovery projects, but where the benefits may be less substantial or may be delayed for quite some time (USBWP 2005).

Because the SHIPUSS priorities encompass multiple salmonid species, priority streams for steelhead under this recovery plan are those that also intrinsic potential for steelhead. For example, Hughes Creek in the North Fork drainage is a SHIPUSS Priority I stream and has high intrinsic potential.

Habitat actions: The following habitat actions are intended to improve productivity rates and increase the capacity for natural smolt production in the population.

1. Continue to increase habitat complexity, pool frequency, and spawning habitat by adding structures to stream channels. Salmon-Challis National Forest and Trout Unlimited have completed projects in both Indian Creek and the North Fork in which they placed multiple log structures. But there are many more miles of stream in which habitat quality is limited by lack of complexity and pools and where placed structures could improve fish habitat by creating pools, stabilizing banks, creating scour, and retaining spawning gravels (USFS 2000). NMFS recommends new projects to increase habitat complexity and monitoring of completed projects to track their effectiveness. Monitoring of log-drop structures placed in Indian Creek has shown that steelhead are spawning in habitat associated with the structures (USFS 2004).

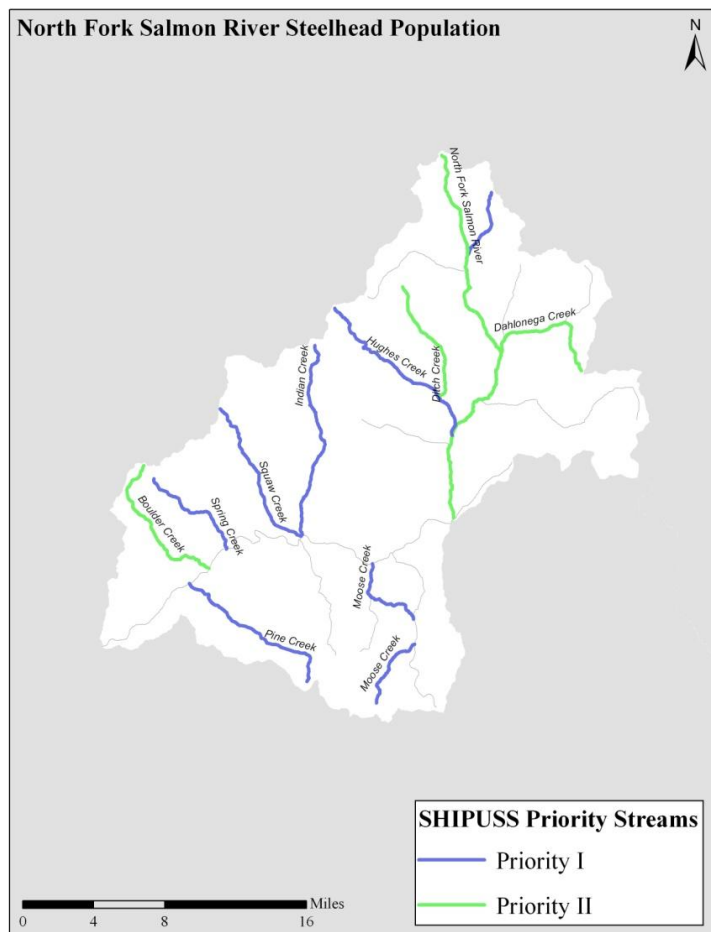


Figure 5.3-40. Priority streams for habitat actions in the North Fork Salmon River steelhead population.

Reestablishing riparian vegetation will also provide cover, stabilize streambanks, and reduce stream temperatures (Ecovista 2004). The lower portions of Hughes Creek and Dahlenega Creek have been channelized and altered by mining tailings. Reestablishing a natural channel would improve riparian function.

2. Reduce impacts to habitat from irrigation diversions. For the North Fork, as for much of the Upper Salmon River Basin, a key habitat goal is to restore natural hydrographs in important anadromous fish streams, thus ensuring adequate base flows, channel-maintaining peak flows,

and normal flow timing (Ecovista 2004). The Upper Salmon Basin Watershed Project (USBWP), BPA, and IDWR will continue to work with private landowners to secure instream flows and improve diversion dams, conveyance systems, and irrigation efficiency. Improving diversion dams includes adding screens to unscreened diversions and thus reducing risk of fish entrainment.

3. Eliminate fish passage barriers that are blocking steelhead from accessing potential habitat.

Implementation of Habitat Actions

Implementation of habitat actions for this population will occur primarily through the efforts of the USFS, state agencies, and local stakeholder groups. On federal lands, following the existing USFS Land and Resource Management Plan should provide the protection needed for this population. Where active restoration is needed, implementation of this recovery plan will likely occur through the work of non-profit organizations, such as the Upper Salmon Basin Watershed Project. No short-term projects are currently funded for the North Fork steelhead population.

Many habitat restoration projects have already been completed in this population. NPCC (2004) reported that 56 projects have been completed that are directed at improving fish and wildlife habitat in the Middle Salmon-Panther watershed, which includes both the North Fork Salmon River and Panther Creek steelhead populations. The most frequent projects to restore fish habitat were instream structures and fish passage improvements. NPCC (2004) also reported riparian fencing, road and trail work, and diversion modifications. A partial list of accomplishments includes the following projects that have been completed (Table 5.3-41).

Table 5.3-41. Partial list of habitat actions that have been benefited the Pahsimeroi steelhead population.

Year	Habitat Improvement Actions
2010	The Hughes Creek culvert is in the engineering design phase for fish passage restoration.
1992	Salmon River Tributary Fish Passage Improvements (Squaw and Spring Creeks)
1991	Salmon River Tributary Fish Passage Improvement (Pine Creek)
1991	North Fork Salmon River Tributary Fish Passage Improvements (Nez Perce and Threemile Creeks)

Habitat Cost Estimate for Recovery

No short-term projects are currently funded for the North Fork steelhead population. Because the population is tentatively estimated to have achieved its desired status, no future costs are attributed to the recovery plan.

Hatchery Recovery Strategy and Actions

[to be added]

Harvest Recovery Strategy and Actions

[to be added]

5.3.6.10 Pahsimeroi River Steelhead Population

Abstract/Overview

The Pahsimeroi River steelhead population is tentatively rated as maintained because the surrogate population for A-run steelhead passing Lower Granite Dam is at moderate risk, based on recent abundance and productivity. Population spatial structure and diversity are also currently rated at moderate risk. The Pahsimeroi population is targeted to achieve the desired status of Maintained, which requires no more than moderate abundance/productivity and spatial structure/diversity risk.

Current Status	Desired Status
Maintained	Maintained

The desired status for the Pahsimeroi River population suggests that no recovery plan actions directed specifically at this population are necessary. However, a conservative management approach should be pursued until population-specific data become available to more accurately describe the status of this population. Recovery actions in the Snake and Columbia Rivers migration corridor, and spawning and rearing habitat actions aimed primarily at spring/summer Chinook, will further reduce the risk for this population.

While current best available information indicates that this population has achieved its desired status, there is a high degree of uncertainty in estimating the population's current status, as well as the nature and timing of the population's response to various recovery strategies. Due to this uncertainty, it is important to use an adaptive management strategy, in conjunction with the ESA's five-year status reviews and the information in the Research, Monitoring, and Evaluation chapter. If new information shows that this population has not achieved its desired status, it is imperative to identify those actions that are most likely to yield additional improvement.

Introduction

This section of the recovery plan compares the population's desired status to its current status, and describes how the population fits into the recovery strategy for the MPG and DPS. The primary sources of information are the ICTRT viability criteria (NMFS 2007b) and the ICTRT's Snake River steelhead status assessment (ICTRT 2008).

Population Status

The Population Status section describes the population's current status as defined in the ICTRT's most current status assessment (ICTRT 2008) where they discussed risk in terms of four viability parameters: Abundance, Productivity, Spatial Structure and Diversity. Other available information was also considered. The section focuses primarily on population Abundance (the total number of adults) and Productivity (the ratio of returning adults to the parental spawning adults). It compares the population's current status to the desired status in terms of both abundance and productivity. It also summarizes Spatial Structure (the amount and nature of available habitat) and Diversity (genetic traits) concerns identified by the ICTRT. Diversity concerns are also discussed in the hatchery section. More details are available in the Snake River steelhead status assessment (ICTRT 2008).

Population Description: This population includes the Pahsimeroi River and its tributaries, as well as all tributaries to the Salmon River from the mouth of the Lemhi upstream to the Pahsimeroi. The population is separated from steelhead spawning aggregates by a minimum of 40 km and was

identified as an independent population on this basis. The current steelhead distribution in the Pahsimeroi watershed includes the Salmon River, lower Pahsimeroi River, Patterson Creek, and Falls Creek. In the Salmon River tributaries, steelhead may also be distributed in accessible areas of Iron, Hat, and Williams Creeks. A NMFS model of potential habitat for the Interior Columbia Basin, based on geomorphological characteristics, suggests that the historic distribution of steelhead could have included more tributaries to the Pahsimeroi River and to the mainstem Salmon River, and could have been more expansive in some streams than current distribution (NMFS 2006) (Figure 5.3-41). Access to some potential historic habitat is currently blocked by irrigation diversion structures and by the reduced streamflow associated with the seasonal water withdrawals at these structures. The Pahsimeroi River population is an A-run population.

IDFG operates a hatchery program in the Pahsimeroi River, with hatchery facilities and a permanent weir less than a mile from the confluence with the Salmon River. The hatchery is funded by Idaho Power Company as mitigation for fishery losses related to construction of hydroelectric dams on the Snake River in Hells Canyon. The hatchery's steelhead broodstock was largely sourced from Snake River/Hells Canyon A-run stock.

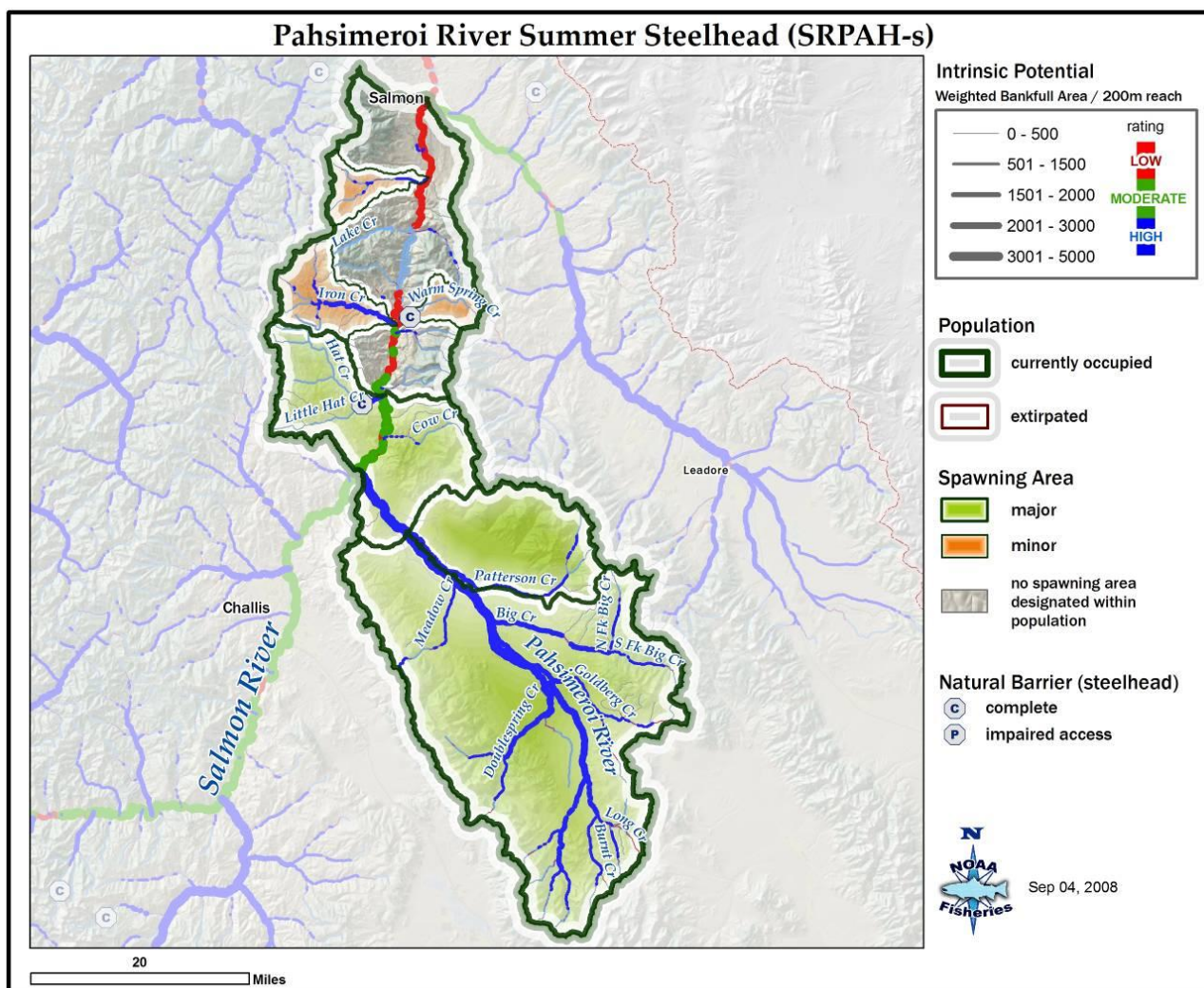


Figure 5.3-41. Pahsimeroi River steelhead population, with major and minor spawning areas.

The ICTRT classified the Pahsimeroi River population as “intermediate” in size and complexity based on historical habitat potential (ICTRT 2007). A steelhead population classified as intermediate has a mean minimum abundance threshold of 1,000 natural-origin spawners with sufficient intrinsic productivity (≥ 1.14 recruits per spawner at the abundance threshold) to achieve a 5 percent or less risk (“low risk”) of extinction over a 100-year timeframe. For the Pahsimeroi population to achieve a 25 percent or less risk (“moderate risk”) of extinction over 100 years, abundance and productivity targets are somewhat lower.

Abundance and Productivity: Spawning abundance estimates are available for a section of this population based on counts over the Pahsimeroi Hatchery weir in the lower Pahsimeroi River. Only natural-origin steelhead are allowed to pass over the weir. In 1979, 1,656 natural-origin adults returned to the weir but only 36 were allowed to pass upstream to spawn. No data are available from 1980 to 1985. In 1986, 70 natural-origin adults returned to the weir and 44 were allowed to pass upstream. Starting in 1987, all natural-origin arrivals have been passed upstream to spawn. Natural-origin spawners in this section of the population have ranged from 17 to 460 between 1985 and 2006 (Table 5.3-42). The 10-year geometric mean abundance from 1997 to 2006 is 73 adults.

Table 5.3-42. Natural-origin steelhead intercepted at the Pahsimeroi Fish Hatchery weir (1986-2006).

Run-year to weir	Natural-origin arrivals
1986	70
1987	259
1988	460
1989	166
1990	118
1991	26
1992	39
1993	24
1994	35
1995	17
1996	17
1997	25
1998	48
1999	38
2000	58
2001	133
2002	376
2003	180
2004	67
2005	42
2006	68

No spawner abundance data is available for the rest of the Pahsimeroi River below the weir, or for the Salmon River tributaries in this population. Furthermore, natural spawners include returns originating from naturally spawning parents (natural or hatchery-origin) and returns of hatchery steelhead. Large numbers of hatchery steelhead (adipose-clipped smolts) are released below the Pahsimeroi River weir

and in the mainstem section of the Salmon River between the Pahsimeroi River and the Lemhi River for harvest augmentation under dam mitigation programs. Some of these hatchery fish are likely spawning naturally within this population, but it is nearly impossible to determine how many.

Since most Snake River steelhead populations (including all of the Idaho populations) do not have direct estimates of annual spawning escapements, the ICTRT generated preliminary estimates of average population abundance and productivity for the Snake River populations using annual counts of wild steelhead passing Lower Granite Dam. Estimates were developed for two average surrogate populations to represent both major run types (A and B). These abundance and productivity estimates were then compared to a viability curve for an intermediate-sized Snake River steelhead population (requiring a minimum abundance threshold of 1,000 natural-origin spawners and a productivity of 1.14 recruits per spawner).

The surrogate population for A-run steelhead above Lower Granite Dam has an estimated recent abundance of 556 and productivity of 1.86. It is rated as Moderate Risk based on current abundance and productivity, as shown in Figure 5.3-42 (25% or less risk of extinction over a 100-year timeframe). Although the current estimate of intrinsic productivity is above the minimum threshold for low risk, the current average natural abundance (recent 10-year geometric mean) is well below the ICTRT minimum threshold value of 1,000. More specific information about how the abundance and productivity estimates were calculated is included in the ICTRT's steelhead status assessment Appendix B-1 *Calculating Representative Abundance and Productivity Estimates for Snake River A and B run Steelhead Populations*.

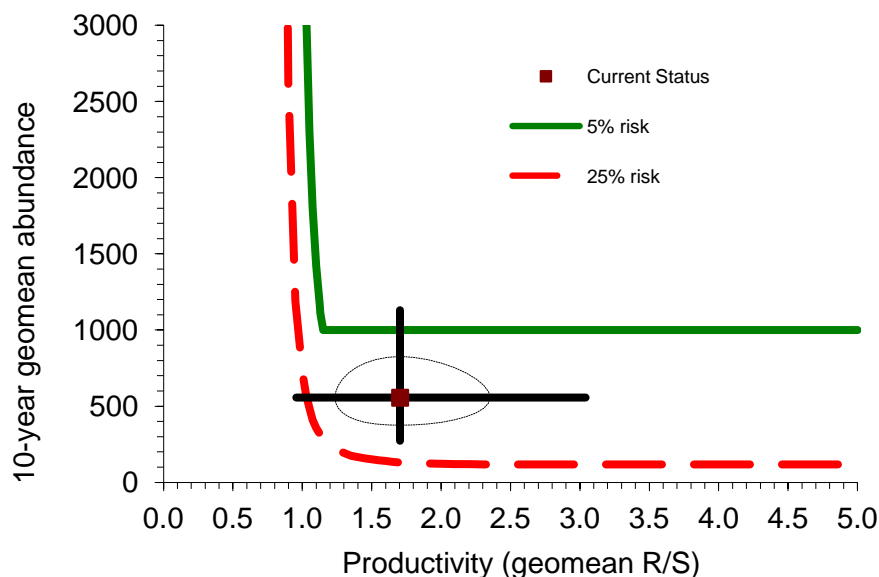


Figure 5.3-42. Snake River A-run surrogate steelhead population current estimated abundance and productivity (A/P) compared to DPS viability curve (1986-2005). Ellipse = 1 SE about the point estimate. Error bars = 90% CI for A, 98% CI for P (if point estimate >1% risk curve, the uncertainty test is <1% probability the combined A/P is at high risk).

Based on the surrogate A-run population, the ICTRT gave this population a tentative abundance/productivity rating of moderate risk.

Spatial Structure: The ICTRT has identified three major spawning areas (i.e., Pahsimeroi, Patterson Creek, and Lower Pahsimeroi) and two minor spawning areas (i.e., Iron Creek and Williams Creek) in this population. Occupancy of historic spawning areas has been inferred from data collected during presence/absence and density monitoring for juvenile steelhead. Juvenile steelhead are present in the upper and lower halves of the Lower Pahsimeroi and Patterson major spawning areas, but only in the lower half of the upper Pahsimeroi major spawning area, leading to a reduction and simplification of the population's spatial structure. Until recently, the two minor spawning areas on the Salmon River have appeared to be unoccupied, increasing the gap between this population and other downstream steelhead populations. (A barrier on lower Iron Creek was removed in spring 2007, and steelhead/rainbow trout were observed in this minor spawning area in summer 2007 (Curet et al. 2009)). These factors contribute to a cumulative moderate spatial structure risk for the population, which is sufficiently low for the population to reach its desired overall status.

Diversity: The major life history strategies historically represented in the Pahsimeroi population are unknown. The population is currently classified as consisting only of A-run steelhead, and the ICTRT tentatively assumed that all historic major life history pathways are currently present. Irrigation practices in the basin result in dewatering of the lower reaches of many tributaries for a significant part of the year. The disconnection of tributaries from the mainstem Pahsimeroi River affects juvenile movement patterns and habitat use during freshwater rearing, leading to a change in the population's phenotypic variation. Irrigation practices have also reduced steelhead access to the upper portion of the Pahsimeroi subbasin. Historically this population may have occupied five ecoregions, including dry gneissic-schistose volcanic hills in the mid-elevations of the Pahsimeroi watershed, but current distribution has been reduced almost exclusively to dry intermountain sagebrush valleys, reducing the population's diversity of habitat types.

Hatchery fish are likely influencing the diversity of this population. The current Pahsimeroi River hatchery program, founded from both local and out-of-MPG stocks, releases marked hatchery smolts for harvest augmentation in the Pahsimeroi River. Additionally, hatchery steelhead are released into the East Fork Salmon River and Upper Mainstem Salmon River populations (for both supplementation of the natural populations and harvest augmentation). These fish must swim through the Salmon River mainstem portion of the Pahsimeroi population as adults when returning to their release sites. Some returning hatchery fish are not harvested in fisheries and do not recruit back to weirs or traps, and are thus spawning naturally. Recent surveys by the IDFG documented the presence of significant proportions of hatchery-origin spawners in many of the main Salmon River tributaries. Only natural-origin steelhead have been released into the Pahsimeroi River upstream of the hatchery weir since at least 1985, but hatchery fish are likely spawning in the lower Pahsimeroi and in tributaries to the main Salmon River between the Pahsimeroi and Lemhi River confluences. Although the ICTRT considered the two main Salmon River minor spawning areas to be unoccupied, a low level of dispersed steelhead spawning may occur in Salmon River tributaries, and hatchery fish may be a large component of these spawners. Based on the recent low returns of natural spawners into the Pahsimeroi River itself (counted at the weir), the presence of hatchery spawners in tributaries may have a large population-level effect on spawner composition.

The factors discussed above lead to a moderate cumulative diversity risk, which is adequate for the population to reach its desired status.

Summary: The Pahsimeroi River steelhead population is currently at moderate risk due to a tentative moderate risk rating for abundance/productivity and a moderate risk rating for spatial structure/diversity. A population-specific monitoring program is necessary to reduce the uncertainty of the abundance/productivity rating, which is based on an average dataset for the DPS. Table 5.3-43 shows the population's current and desired status (both maintained) in terms of cumulative abundance/productivity and spatial structure/diversity risks. A complete version of the ICTRT's draft status assessment for Snake River Basin steelhead populations is available upon request from NMFS.

Table 5.3-43. Pahsimeroi River population risk ratings integrated across the four viable salmonid population (VSP) metrics.

		Spatial Structure/Diversity Risk			
		Very Low	Low	Moderate	High
Abundance/ Productivity Risk	Very Low (<1%)	HV	HV	V	M
	Low (1-5%)	V	V	V	M
	Moderate (6 – 25%)	M	M	M Pahsimeroi River	HR
	High (>25%)	HR	HR	HR	HR

Viability Key: HV – Highly Viable, V – Viable, M – Maintained, and HR – High Risk; shaded cells – do not meet viability criteria, with darkest cells signifying the highest risk of extinction. Percentages refer to risk of extinction over 100 years. Arrow points to desired risk status.

This population is estimated to be meeting its desired status of maintained, so no recovery plan actions directed specifically at this population are necessary at this time. However, the following sections on limiting factors and recovery strategies are included for several reasons. Considerable uncertainty is involved in achieving the desired status for all of the populations within the Salmon River MPG, so further reducing the risk status for the Pahsimeroi River population could provide flexibility for meeting the delisting goal for the MPG. Due to lack of population-specific abundance and productivity data, there is also uncertainty associated with the conclusion that the Pahsimeroi River population is currently meeting its desired status. Finally, further reducing the extinction risk for this population could be necessary for meeting goals beyond compliance with the Endangered Species Act, such as additional harvest by the state of Idaho or interested tribes.

Limiting Factors and Threats Specific to Population

This section describes the limiting factors and threats that are specific for the population. The population is also affected by limiting factors and threats in the mainstem Columbia/Snake River corridor, estuary, and plume, and by climate change. Section 5.1.1 summarizes regional-level factors that affect all Idaho Snake River steelhead populations.

Natal Habitat

Habitat Conditions: The Pahsimeroi steelhead population includes the Pahsimeroi watershed and the Salmon River and its tributaries from its confluence with the Pahsimeroi River downstream to its confluence with the Lemhi River. The Pahsimeroi River steelhead population geographic boundary drains approximately 1,325 square miles. The drainage is semiarid, with most of the precipitation falling as snow in the higher elevations. The higher elevations may receive up to 30 inches (water content) per year, while lower elevations receive as little as 8 inches annually (Young and Harenberg 1973). Peak streamflows historically occurred during late May and early June as a result of rapid snowmelt, but are now much smaller than historic peak flows because of irrigation withdrawals. The surface and groundwater system throughout the basin is highly connected (Meinzer 1924; Young and Harenberg 1973), such that streamflow can be affected by both surface and groundwater withdrawals.

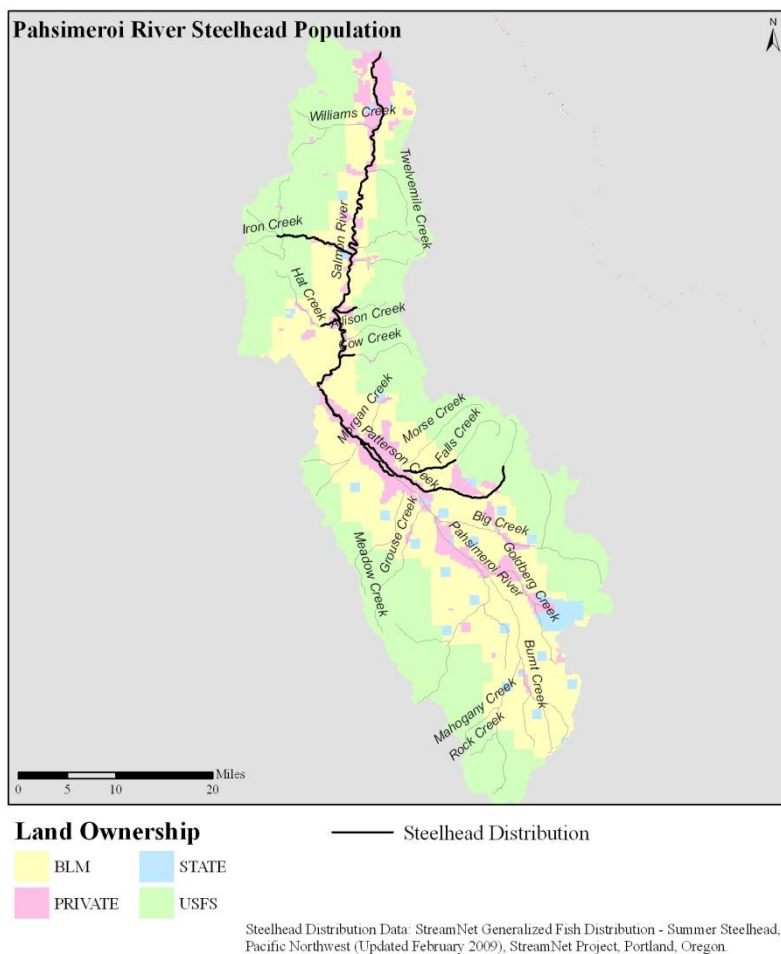


Figure 5.3-43. Land ownership pattern displayed in the Pahsimeroi River Steelhead Population.

Land ownership within the Pahsimeroi River steelhead population is mostly U.SFS (51.8%) and BLM (36.8%). Private (8.8%) and state of Idaho (2.6%) make up a smaller portion of ownership in the Pahsimeroi River steelhead population. The land ownership pattern is private along valley bottoms along the Pahsimeroi River and two large sections in the Big Creek and Patterson Creek drainages (Figure 5.3-43). BLM lands generally occur in the mid-elevation reaches, with USFS lands located in higher elevations. State owned lands are township sections scattered mostly within BLM lands. In terms of land area, 30,000 acres of the Pahsimeroi River watershed are in irrigated agriculture (hay, pasture or crop); 263,430 acres are rangelands; and the remaining 244,970 acres are primarily USFS lands (timber and range) (ISCC 1995).

The Pahsimeroi River subbasin has been degraded from its historic condition. Over a century of livestock grazing and instream flow alterations have substantially altered the vegetation, structure, and connectivity of the riparian zones in the Pahsimeroi watershed. Altered riparian communities exist in the lower portions of the watershed, overlapping much of current occupied Chinook and steelhead habitat (NPCC 2004, p. 3-16). Water diversions create many seasonally disconnected tributaries in the

Pahsimeroi River valley. The predominant land use is ranching and cattle grazing, although historic mining did occur (ISSC 1995). Patterson Creek (also known locally as Big Springs Creek) may have degraded water quality from zinc leaking downstream of the IMA Mine, an abandoned tungsten mine (NPCC 2004, p. 3-16). There are no significant timber resources in the Pahsimeroi watershed although there are occasionally a few post and pole timber sales (ISSC 1995). In tributary streams draining directly into the Salmon River, subwatershed descriptions provided by the IDEQ (2001) for Hat, Iron, Williams, Rattlesnake, and Warmsprings Creeks indicate similar land uses to the Pahsimeroi River, although timber harvest appears to have been more prevalent.

There are about 695 km (431 miles) of potential stream habitat for steelhead below natural barriers, out of a total 930 km (578 miles) of stream habitat for the population (ICTRT 2009). Current spawning and rearing for steelhead occurs in the Pahsimeroi River from its mouth upstream to Hooper Lane, and in Falls Creek and Patterson-Big Springs Creek. Steelhead have recently been observed in the Iron Creek minor spawning area (Curet et al. 2009), but the Williamson Creek minor spawning area is believed to be unoccupied. Most tributaries are disconnected from the mainstem Pahsimeroi River by irrigation diversions, and the flow is often intermittent in the upper parts of the basin. Diverted water returns to the river via large springs near the center of the valley, so the lower Pahsimeroi River has flow year-round and high connectivity to the Salmon River. Within this lower reach, the river is a low-gradient stream dominated by groundwater flow, which moderates temperature. The channel is sinuous and well-developed and has a large proportion of pool habitat. During the summer, submergent plants grow in the main channel, indicating a relatively high level of aquatic productivity, which sets the Pahsimeroi River apart from other tributaries in the Salmon River basin (Copland and Venditti 2009).

The IDEQ's Integrated (303(d)/305(b)) Report for the Clean Water Act identifies stream segments in this population that are not fully supporting their assessed beneficial uses. Table 5.3-44 shows the impaired stream segments listed in IDEQ's 2008 Integrated Report under section 5 (impaired waters that need a TMDL), section 4c (waters impaired by non-pollutants), and section 4a (impaired waters that have an EPA-approved TMDL) (IDEQ 2009).

Table 5.3-44. Stream segments in the Pahsimeroi River steelhead population identified from Sections 4a, 4c, and 5 of the IDEQ 2008 303(d)/305(b) integrated report (IDEQ 2009).

Waterbody	Impairment/Cause	Stream Miles
Section 5-303(d) - Impaired Waters Needing a TMDL		
Pahsimeroi River - Meadow Creek to Patterson Creek	Sedimentation/Siltation; Water temperature; Combined Biota/Habitat Bioassessments*	50.69
Pahsimeroi River - Meadow Creek to Patterson Creek	Particle distribution (Embeddedness)	2.47
Pahsimeroi River - Meadow Creek to Patterson Creek	Water temperature; Cause Unknown	10.21
Lawson Creek - confluence of North and South Fork Lawson Cr	Combined Biota/Habitat Bioassessments	1.82
North Fork Lawson Creek - source to mouth	Combined Biota/Habitat Bioassessments	11.83
South Fork Lawson Creek - source to mouth	Combined Biota/Habitat Bioassessments	11.91
Meadow Creek - source to mouth	Combined Biota/Habitat Bioassessments;	28.51
Pahsimeroi River - Furley Road (T15S, R22E) to Meadow Creek	Cause Unknown**	1.56
Grouse Creek - source to mouth	Combined Biota/Habitat Bioassessments	35.96
Pahsimeroi River - Goldburg Creek to Big Creek	Cause Unknown	12.06
Pahsimeroi River - Unnamed Tributary (T12N, R23E, Sec. 22)	Cause Unknown	2.54

Waterbody	Impairment/Cause	Stream Miles
Pahsimeroi River - Burnt Creek to Unnamed Tributary (T12N, R23E, Sec. 22)	Cause Unknown	10.34
Burnt Creek - Long Creek to mouth	Combined Biota/Habitat Bioassessments	5.06
Short Creek - source to mouth	Combined Biota/Habitat Bioassessments	5.83
Donkey Creek -source to mouth	Combined Biota/Habitat Bioassessments	13.56
Big Creek - confluence of North and South Fork Big Creeks to Pahsimeroi River	Sedimentation/Siltation; Cause Unknown	13.56
Salmon River Tributaries - Williams Creek to Pollard Creek	Combined Biota/Habitat Bioassessments	48.88
Salmon River - Williams Creek to Pollard Creek	Combined Biota/Habitat Bioassessments	8.81
Salmon River - Twelvemile Creek to Williams Creek	Combined Biota/Habitat Bioassessments	6.41
Salmon River - Iron Creek to Twelvemile Creek	Combined Biota/Habitat Bioassessments	12.6
Salmon River - Pahsimeroi River to Iron Creek	Combined Biota/Habitat Bioassessments	18.88
Cow Creek - source to mouth	Combined Biota/Habitat Bioassessments	27.28
Section 4c-Waters Impaired by Non-pollutants		
Meadow Creek - source to mouth	Low flow alterations	28.51
Grouse Creek - source to mouth	Low flow alterations	35.96
Pahsimeroi River - Goldburg Creek to Big Creek	Low flow alterations	6.64
Pahsimeroi River - Burnt Creek to Unnamed Tributary (T12N, R	Low flow alterations	10.34
Patterson Creek - Inyo Creek to mouth	Other flow regime alterations	14.97
Morgan Creek - source to mouth	Low flow alterations	14.07
Section 4a- Impaired Waters with EPA-Approved TMDLs		
Pahsimeroi River - Patterson Creek to mouth	Sedimentation/Siltation; Water temperature	14.22
Pahsimeroi River - Meadow Creek to Patterson Creek	Sedimentation/Siltation	13.25
Pahsimeroi River - Big Creek to Furley Road (T15S, R22E)	Sedimentation/Siltation	3.18
Pahsimeroi River - Goldburg Creek to Big Creek	Sedimentation/Siltation	12.06
Pahsimeroi River - Unnamed Tributary (T12N, R23E, Sec. 22) t	Sedimentation/Siltation	2.54
Pahsimeroi River - Burnt Creek to Unnamed Tributary (T12N, R	Sedimentation/Siltation	10.34
Pahsimeroi River - Mahogany Creek to Burnt Creek	Sedimentation/Siltation; Water temperature	6.17
East Fork Pahsimeroi River - source to mouth	Sedimentation/Siltation; Water temperature	1.42
Salmon River - Iron Creek to Twelvemile Creek	Phosphorus (Total)	68.74

*The "Combined Biota/Habitat Bioassessments" cause is assigned to a waterbody when bioassessment scores indicate poor habitat and/or aquatic community conditions and there is insufficient information to determine the cause(s) of the poor bioassessment scores.

***"Cause Unknown" as an impairment is used by IDEQ when instream monitoring protocols indicate the stream segment does not support the beneficial uses but the cause of the problem is not clear and may not be identifiable until a full water body assessment or TMDL is completed. For example, a review of the benthic organisms present in a water body may indicate a water quality problem.

Current Habitat Limiting Factors: NMFS determined the habitat limiting factors by reviewing multiple data sources and reports on stream conditions. Based on reports and discussions with local fisheries experts and watershed groups, NMFS concluded that the habitat limiting factors for the Pahsimeroi steelhead population are reduced streamflow, passage barriers, sedimentation, elevated stream temperatures, degraded riparian conditions, and juvenile fish entrainment. Table 5.3-45 summarizes the mechanisms by which each limiting factor affects steelhead, and the management objectives for addressing each limiting factor. The following section discusses the limiting factors using information from IDEQ reports, the Salmon Subbasin Assessment and Management Plan, and Idaho Model Watershed Plan (IDEQ 2001; IDEQ 2009; ISSC 1995; NPCC 2004; Ecovista 2004).

Table 5.3-45. Primary limiting factors identified for the Pahsimeroi River steelhead population, mechanisms by which each limiting factor affects salmonids, and management objectives for addressing each limiting factor.

Limiting Factors	Effects on Salmonids	Management Objectives to Address Limiting Factors
Stream Flow	Low stream flows reduce available habitat, can exacerbate high stream temperature conditions, and in extreme conditions can create barriers to migrations or movement (dry stream channels).	Increase instream flow and stream connectivity.
Migration Barriers	Migration barriers such as dams, culverts, and dewatered stream sections can create fish passage barriers. These barriers reduce or eliminate movement of adult and juvenile salmon within a watershed, ultimately reducing potential spawning and rearing habitat.	Correct or remove fish passage barriers.
Sediment	Excess sediments can reduce juvenile habitat (rearing), aquatic insect availability (food), and spawning and incubation success (reproduction).	Riparian restoration actions to stabilize streambanks and reduce sedimentation to the stream.
Temperature	High stream temperatures affect salmonid growth and development, alter life history patterns, induce disease, or exacerbate competitive predator-prey interactions. High stream temperature can also be lethal to both adult and juvenile salmon.	Riparian restoration actions to improve shade and stream cover to reduce stream temperature.
Riparian Conditions	Poor riparian conditions reduce habitat quality, streambank stability (sediment and channel condition), shade (stream temperature), and LWD recruitment (habitat complexity and pool formation).	Riparian restoration actions to increase habitat complexity and LWD recruitment.
Entrainment	Juvenile fish entrainment occurs through unscreened irrigation diversions. Young salmon are at risk when they are diverted into canals or diversion ditches.	Screen irrigation diversion structures.

1. Reduced Flow During Critical Periods.

Reduced stream flow is the most important habitat factor limiting abundance and productivity for this population. Stream flow conditions are also affecting spatial structure within the population by eliminating access to the upper Pahsimeroi River and to tributary habitat, and are affecting diversity by limiting juvenile movement patterns and habitat use.

The NPCC's subbasin plan identified dewatering and reduced flows as one of the primary impacts on aquatic habitat quality in the Pahsimeroi River subbasin (NPCC 2005a, p. 3-18). There are approximately 38,000 acres of irrigated agriculture in the Pahsimeroi River subbasin (IDWR unpublished data), which results in the consumptive use of approximately 57,000 acre feet of water per year. This means that approximately 25 percent of the annual flow of the Pahsimeroi River is removed from the system each year. An estimated 84 percent of the farmland is irrigated with surface water diversions that directly reduce streamflow, and the remaining 16 percent of farmland is irrigated with groundwater. Groundwater pumping may lower groundwater levels and thus indirectly impact streamflow. Irrigation in the Pahsimeroi valley started in 1870 and amount of land irrigated has increased over time (Table 5.3-46). Between 1971 and 2003, groundwater levels dropped by as much as 39 feet, possibly due to an increase in groundwater pumping. Surface water and groundwater in the Pahsimeroi River drainage appear to be closely linked (Meinzer 1924; Young and Harenberg 1973), so the Pahsimeroi River and its tributaries might be experiencing a long-term decline in streamflow due to dropping groundwater levels.

Table 5.3-46. Amount of land irrigated from surface water and ground water sources in the Pahsimeroi River drainage (citation).

Decade	Total land (acres) irrigated from surface water sources at the end of the decade	Total land (acres) irrigated from ground water sources at the end of the decade
1870-1879	851	0
1880-1889	4,561	0
1890-1899	7,554	0
1900-1909	15,634	0
1910-1919	22,944	0
1920-1929	27,540	0
1930-1939	27,741	0
1940-1949	28,163	4
1950-1959	30,579	832
1960-1969	31,442	3,615
1970-1979	32,357	5,196
1980-1989	32,513	5,239
1990-1999	32,514	5,680

Although the lower Pahsimeroi River never completely dries, its flows are severely altered by water use. Streams in central Idaho that are not impacted by irrigation experience high flow from mid-April through mid-July and baseflow conditions for the rest of the year. Streams that are moderately impacted by irrigation experience high flow from mid-April through mid-July, very low flow in August and September, and normal baseflow conditions from October through March (Arthaud et al. 2010). In contrast, the lower Pahsimeroi River experiences lower than normal base flow from May through September and normal base flow for the rest of the year, indicating a highly modified hydrograph (Arthaud et al. 2010). Water use has essentially eliminated high spring flows. Additionally, extensive development of water resources has reduced access to tributary and mainstem habitat, and has reduced the amount of currently accessible mainstem habitat.

2. *Migration Barriers.*

Currently much of the Pahsimeroi watershed is inaccessible to steelhead due to barriers related to irrigation withdrawals. Most tributaries are disconnected from the mainstem Pahsimeroi River by irrigation diversions, and streamflow is often intermittent in the upper parts of the basin. Figure 5.3-44 shows surface water diversions in the watershed, along with local landmarks. The Idaho Model Watershed Plan identified insufficient flows for adult migration below the Ellis diversion as one of two major limiting factors affecting the Pahsimeroi River (ISCC 1995). Migration barriers are caused by water diversion structures and by low stream flow or dry channels. These barriers preclude steelhead from using habitat in the middle and upper Pahsimeroi River, Goldberg Creek, and many smaller tributaries. The reduction in accessible habitat caused by migration barriers has reduced the productivity and abundance of the Pahsimeroi steelhead population. Migration barriers have also reduced the population's spatial structure.

The mainstem Pahsimeroi River dries below Furey Lane (river mile 17.8) in summer due to surface water diversions and flows going subsurface. The reach below Furey Lane, where flow goes subsurface, has been described as a “natural” sink. However, as late as the mid-1920s the Pahsimeroi

River had perennial flow from Goldberg Creek (river mile 26.4) to its mouth (Meinzer 1924), in spite of approximately 25,000 acres being irrigated at that time.

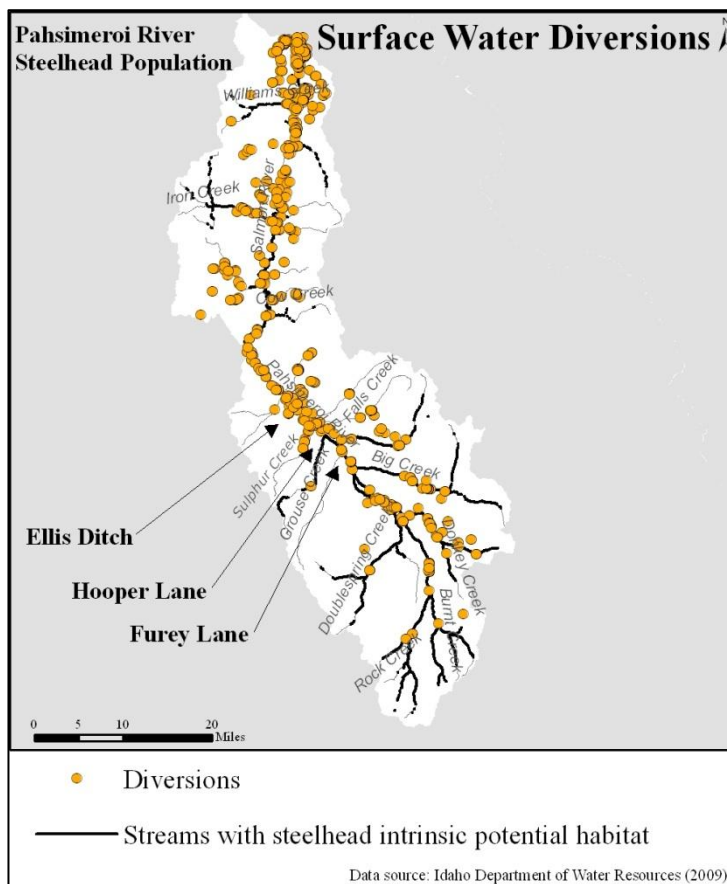


Figure 5.3-44. Surface water diversions in the Pahsimeroi River steelhead population.

Most of the tributaries upstream from Goldberg Creek are connected to the mainstem Pahsimeroi River and have surface flow year round. Most tributaries downstream from Goldberg Creek are dry for most of the irrigation season, and many have been completely disconnected from the mainstem Pahsimeroi River for many years. Due to the geology of the Pahsimeroi valley, many of these tributaries were likely intermittent historically. On the other hand, based on descriptions in Meinzer (1924), some larger tributaries in the east and south parts of the valley were likely perennial (Colvin 2006). These tributaries include the upper Pahsimeroi mainstem, Big Creek, Patterson Creek, Falls Creek, Morse Creek, and Morgan Creek, all of which could potentially be reconnected to the mainstem. Most of the streams on the west side of the valley quickly infiltrate into the substrates and do not even reach the valley floor. Sulphur Creek is an exception on the west side of the valley in that it currently has intermittent connection to the mainstem and may be a good candidate for reconnection.

As shown in Figure 5.3-44, many irrigation diversions also remove surface water from tributaries to the main Salmon River within the population boundaries. Iron Creek is a tributary to the Salmon River that enters from the west and drains an area of 15,540 hectares. Historically, during summer base flow, the lower most diversion on Iron Creek received all the water from the stream, disconnecting the Iron Creek from the main Salmon River. Iron Creek was reconnected in the spring of 2007 by consolidating the four lowest diversions on the stream into one point of diversion that was moved to a pumping station on the mainstem Salmon River (Curet et al. 2009). The lower reach of Williams Creek, in the population's other minor spawning area, may go dry some years due to irrigation withdrawals (IDEQ 2001). There is a natural migration barrier (waterfall) in Hat Creek, approximately 2.2 miles upstream from its mouth (USFS 2010a).

3. *Excess Sediment.*

Conditions reported for the Pahsimeroi River suggest that sediment is reducing the population's abundance and productivity. IDEQ (2009) has listed segments of the Pahsimeroi River, East Fork Pahsimeroi River, and Big Creek as impaired by high levels of fine sediment (Table 5.3-41, Figure 5.3-45). The Idaho Model Watershed Plan (ISCC 1995) also lists sediment as a limiting factor for salmonids in the Pahsimeroi, primarily high sediment levels in spawning gravels. Cobble

embeddedness in the Pahsimeroi River is approximately 50 percent, with similar levels in Patterson Creek and Big Creek (ISCC 1995). McNeil core sediment sampling showed subsurface fines (particles < 6 mm) in excess of 50 percent in Patterson Creek and at one sample site in the middle section of the Pahsimeroi River. Morse Creek and upper Pahsimeroi River had 32 and 34 percent subsurface fines, respectively (Shumar et al. 2001). Surface fine sediments assessed during IDEQ BURP and BLM R1/R4 monitoring also indicate high levels of sediment (Shumar et al. 2001; BLM 1999). The Salmon-Challis National Forest has an objective of 20 percent or less fine sediment < 6.35 mm (0.25 in.) to 6 inches depth for streams supporting anadromous fish. Many samples sites within this population have fine sediment levels above this target.

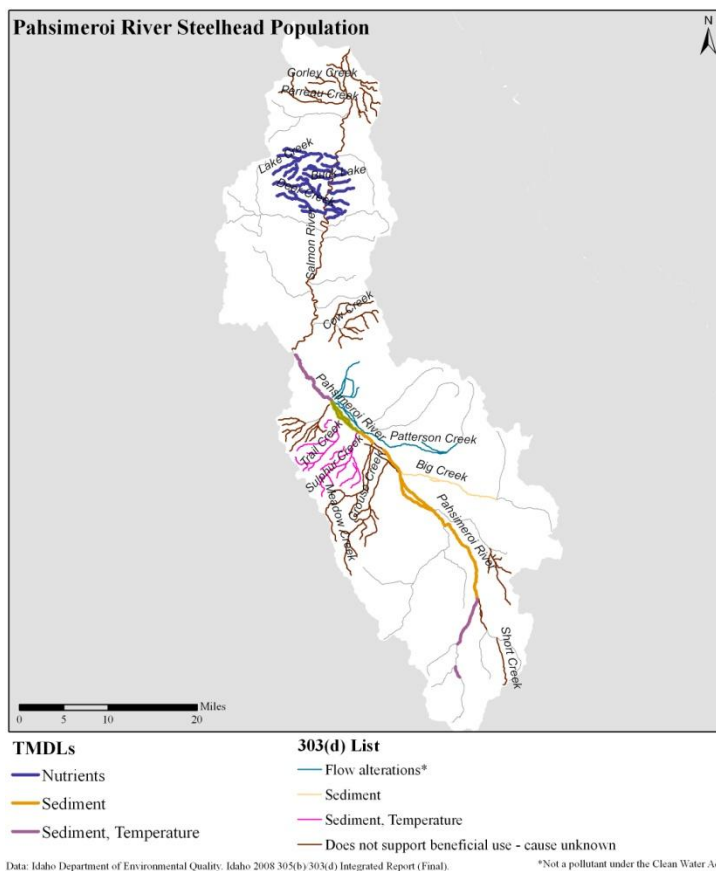


Figure 5.3-45. Stream segments in the Pahsimeroi River steelhead population identified from Sections 4a, 4c, and 5 of the IDEQ 2008 303(d)/305(b) integrated report (IDEQ 2009).

The majority of sediment delivered to the Pahsimeroi River is from streambank erosion (Shumar et al. 2001). Shumar et al. (2001) state that increased streambank erosion from overgrazing within the riparian vegetation zone remains the single largest source of sediment into the Pahsimeroi River. The intensity of livestock grazing and location of irrigation diversion systems throughout the watershed contribute to high sediment levels. The Idaho Model Watershed Plan (ISCC 1995) indicates that high sediment levels are caused by poor streambank stability, head cutting at Sulphur Creek, and diversion-related activities that cause sedimentation. Shumar et al. (2001) indicate that the primary sources of sediment from streambank erosion are above Hooper Lane, affecting the reaches downstream from this point, which are occupied by salmon and steelhead. About 95 percent of the existing total erosion (tons/year) occurs from this area.

As noted by the ISCC (1995), accessible habitat for steelhead within the Pahsimeroi is largely restricted to two areas: the Pahsimeroi River from its mouth to Hooper

Lane and Patterson-Big Springs Creek. The sediments and riparian areas of Patterson Creek, one of the three major spawning areas for this population, may be contaminated with lead, zinc, and other heavy metals from the abandoned Ima Mill and Mine sites. In its Abandoned Mine Lands program associated with this closed tungsten mine, the BLM identified the need for stabilization of the streambanks of the two Patterson Creek sites and mitigation of contaminated areas (BLM 2004). However, there is currently inadequate information available to determine if heavy metals are contaminating surface water in Patterson Creek. Projects to restore habitat quality and access to upstream habitat in Patterson Creek are ongoing. The potential for heavy metal contamination of surface waters should be clarified prior to attempting to resolve other limiting factors in this tributary.

Other sources of sediment in the Pahsimeroi River subbasin are from roads, legacy mining, and legacy forestry. TMDLs have been approved by the U.S. Environmental Protection Agency for sediment/siltation for the Pahsimeroi and East Fork Pahsimeroi Rivers (IDEQ 2009). The recommended load allocation described in IDEQ Pahsimeroi TMDL is for an overall reduction of 74 percent (2,094 tons) in sediment from streambank erosion. Targets described in the TMDL for sediment reduction include attaining streambank stability of 80 percent and subsurface fine sediment levels of 28 percent or less fine sediment (< 6.35 mm) in areas suitable for salmonid spawning.

Elevated sediment levels may also be limiting habitat potential in tributaries to the main Salmon River. Past grazing activities on USFS lands in the upper portions of Cow Creek have contributed to sediment ratings of functioning at risk (USFS 2010b).

4. Elevated Water Temperature.

Conditions reported for the Pahsimeroi River population suggest that temperature is reducing the population's abundance and productivity. Water temperatures for some stream reaches in the Pahsimeroi River exceed state criteria for salmonid spawning (Shumar et al. 2001). Idaho salmonid spawning temperature criteria require water temperatures to not exceed a maximum instantaneous temperature of 13° C (55.4° F) or a maximum daily average temperature of 9° C (48.2° F) during the spawning season (April and May for steelhead in the Pahsimeroi population). In May of 1999, temperatures measured at the Pahsimeroi hatchery intake exceeded the criteria. During this period, the highest maximum instantaneous temperature was 19.1°C (66.4°F) and the maximum temperature criterion was exceeded a total of 17 days. The maximum daily average criterion was also exceeded for 19 days, with the highest daily average at 14.9°C (58.9°F). IDEQ (2009) has listed water temperature impairments in the Pahsimeroi River from the mouth upstream to Meadow Creek, in the Pahsimeroi headwaters from Mahogany Creek to Burnt Creek, and in Trail Creek and Sulphur Creek.

Elevated temperatures in the Pahsimeroi are likely caused by lack of riparian vegetation and reduced stream flows from irrigation withdrawals. Reduced stream flow was identified by IDEQ (2009) as a stream impairment in the Pahsimeroi River and several tributaries (Table 6). Improvement of riparian vegetation density, vigor, and structure would help reduce stream widths and provide shade to the stream, which would reduce stream heat loading (Shumar et al. 2001). Diverting water for irrigation may also play a substantial role in warming stream temperatures. Irrigation diversions cause increased temperatures in two ways: by reducing streamflow volume and thus reducing the temperature buffering capacity of the streams, and by delivery of heat loading from irrigation return water (Poole and Berman 2001).

5. Degraded Riparian Conditions.

Poor riparian conditions can threaten salmonids by impacting sediment, stream temperature, and habitat quality. IDEQ's TMDL for sediment in the Pahsimeroi River prescribes a reduction in streambank erosion and anticipates that this reduction will result from an improvement in riparian vegetation density and structure. An increase in riparian vegetation should help armor streambanks, reduce lateral recession, trap sediment, and reduce the erosive energy of the stream, which should, in turn, reduce sediment loading. It is also expected that improvement of riparian vegetation density and structure would help reduce stream temperatures in the future.

Approximately 61 percent of the drainages within the Pahsimeroi River subbasin have less than satisfactory riparian vegetation conditions, based on stream functionality and/or plant community assessments. Most of these altered riparian communities are in the lower portions of the watershed (NPCC 2004, p. 3-18). Riparian inventories conducted by the BLM (1999) suggest that there are many riparian areas in the Pahsimeroi watershed that are either functioning at risk or not properly functioning, likely due to livestock grazing. Similarly, the riparian habitat in the upper portion of Cow Creek has been impacted by past grazing practices on USFS lands (USFS 2010b). For Williams Creek, a road parallels the stream for much of its length, adversely affecting the riparian vegetation (Kuzis and Bauer 2007).

6. *Entrainment.*

Loss of juvenile steelhead in unscreened diversion structures can affect abundance and productivity. The exact number of unscreened diversions and loss of steelhead in this population is unknown. The large number of irrigation withdrawals in the population area indicates that the risk of entrainment is present throughout much of the population. The Idaho Fish Screen Program builds and maintains screens through a cooperative program funded by National Marine Fisheries Service and Bonneville Power Administration. The IDFG constructs and maintains the screens in cooperation with local water users.

Summary of Current Habitat Limiting Factors and Threats

Freshwater habitat in the Pahsimeroi River subbasin has been degraded from its historical condition. Stream dewatering, alterations to riparian areas, and increased fine sediments have affected freshwater habitat quality (NPCC 2004, p. 3-18). Over a century of livestock grazing and instream flow alteration has altered stream habitat and reduced the connectivity of habitat in the Pahsimeroi subbasin (NPCC 2004) and in tributaries to the main Salmon River. These alterations include reduction in available habitat due to low flows, sedimentation of spawning gravels, high stream temperatures from reduced shading, and bank instability. Each of these factors may act cumulatively or independently to adversely affect the Pahsimeroi River steelhead population (Ecovista 2004, NPCC 2004).

Potential Habitat Limiting Factors and Threats: Several potential concerns have not yet risen to the level of a limiting factor, but should be managed to protect steelhead habitat in the Pahsimeroi River population area and allow any degraded habitat to recover.

1. Reduced instream flow due to new water diversions and wells. Instream flows are already low due to irrigation withdrawals and new surface or groundwater development could further threaten steelhead habitat.
2. Loss of floodplain and riparian function from residential development. Residential development in floodplains and riparian zones can lead to bank instability, loss of riparian vegetation, and loss of floodplain function.
3. Habitat degradation from noxious weeds. The spread of noxious weeds can increase soil erosion and decrease native plant density.

Hatchery Programs

[To be developed]

Harvest Management

[To be developed]

Recovery Strategies and Actions

The recovery strategies that address a limiting factor may include both short-term and long-term actions. Short-term actions are projects scheduled to be implemented within the next ten years by a resource management agency or local stakeholder group. Long-term actions are categories of actions that could increase productivity for the population, but for which a specific project has not yet been proposed by a resource management agency or other stakeholder.

Natal Habitat Recovery Strategy and Actions

Priority stream reaches: Currently accessible reaches of the lower Pahsimeroi River and lower Patterson Creek are the first priority for habitat restoration actions. The second priority for habitat actions is reconnecting tributaries and the middle and upper sections of the Pahsimeroi River.

Habitat actions: The following habitat actions, ranked by priority, are intended to improve productivity, abundance, and spatial structure for the Pahsimeroi River steelhead population.

1. Increase stream flows in the mainstem Pahsimeroi River below Hooper Lane. Currently, this area supports steelhead spawning and rearing, and increasing flow will result in increased productivity in this section of the river. Increasing stream flows above Hooper Lane could create access to historic spawning areas in the upper Pahsimeroi mainstem and its tributaries. An ongoing Idaho Department of Water Resources study should be completed to help identify the best locations and feasibility for additional flow augmentation and reconnection activities in the upper sections of the river.
2. Modify existing barriers caused by either culverts or irrigation diversion structures. Barrier removal should be scheduled to make the best use of additional water added to the system to reconnect mainstem Pahsimeroi River reaches and tributaries.
3. Improve riparian habitat conditions, thus improving instream conditions. This work will be done as implementation of the Pahsimeroi River TMDL, which is designed to improve riparian conditions, reduce temperature, reduce nutrients and reduce sediment (IDEQ 2001). IDEQ prepared a TMDL for this basin in 2001 that concluded that poor riparian habitat conditions and water quality issues are directly linked and that improving riparian conditions will likely reduce sediment, nutrients, and stream temperatures (IDEQ 2001, p. 41). NMFS recommends this work start in the lower reaches of the mainstem Pahsimeroi, or in additional stream reaches occupied by Chinook or steelhead. Riparian vegetation should be restored to the historical range of natural variability.
4. Appropriately screen diversions so as not to entrain fish in ditches. This work should be scheduled in conjunction with the higher priority actions described above and in the context of the priorities

set in the *Screening and Habitat Improvement Prioritization for the Upper Salmon Subbasin* report (USBWP 2005) for the upper Salmon Basin.

Implementation of Habitat Actions

This population is estimated to be meeting its desired status, so no recovery plan actions directed specifically at this population are necessary at this time. However, habitat actions identified for the Pahsimeroi River and Lower Salmon Mainstem spring/summer Chinook populations should also benefit the Pahsimeroi River steelhead population. These actions are listed in Table 5.3-48.

Implementation of this habitat recovery plan will occur primarily through the work of the Custer County Soil and Water Conservation District and the Upper Salmon Basin Watershed Project. Between these two groups there is an excellent representation of private, state and federal entities that manage land and other resources within the population. They have created an effective process for working together, providing technical reviews of proposed projects and working with interested parties to accomplish conservation on the ground. These entities include the IDWR, irrigation districts, IDFG, USFS, BLM, NMFS, The Nature Conservancy, private landowners, and many other groups necessary to accomplish habitat restoration goals.

These groups have a strong record of implementing water quality and salmon conservation projects in the past and have made very important contributions to salmon recovery projects. Recent projects have included reconnecting tributaries, removing barriers, and fencing riparian areas (need citations: 1995-2005 projects from Upper Salmon River Basin Watershed Project, 2007-2009 projects from FCRPS Expert Panel spreadsheet).

Table 5.3-47. Recent habitat improvement projects in the Pahsimeroi River steelhead population area.

Year	Projects completed
1995	Constructed riparian enhancement fence on 4.5 miles of streambank on Pahsimeroi River.
	Transferred a point of diversion from Pahsimeroi River to Salmon River.
1997	Constructed 3 miles of riparian fence on Pahsimeroi River
1998	Constructed riparian fence and implemented grazing management system on 1 mile of Pahsimeroi River and Patterson Creek.
2000	Eliminated 2 diversions on Pahsimeroi River through ditch consolidation
2002	Eliminated 6 miles of ditch in Pahsimeroi River
2003	Consolidated 2 ditches with pipeline on Pahsimeroi River.
	Constructed riparian fences on 0.82 miles of Pahsimeroi River.
2004	Eliminated 2 diversions on Pahsimeroi River by replacement with pipeline
	Constructed riparian fences on 2.75 miles of Pahsimeroi River.
2005	Constructed riparian fences on 5.5 miles of Pahsimeroi River
2007	Constructed 6 miles of riparian fencing on lower mainstem Pahsimeroi River
2009	Installed 3 fish screens and 2 measuring devices on irrigation diversions in the Pahsimeroi subbasin.
	Eliminated diversion on Patterson-Big Springs Creek, reconnecting Big Springs Creek to mainstem Pahsimeroi River
	Reconnected 1 mile of Sulphur Creek to mainstem Pahsimeroi River
	Installed 3 fish screens on main Salmon River tributaries
	Reconnected Iron Creek to main Salmon River
	Increased streamflow in Iron Creek, Big Hat Creek, and Badger Creek

Habitat Cost Estimate for Recovery

The Pahsimeroi River steelhead population is estimated to be meeting its desired status, so no recovery plan actions directed specifically at this population are necessary at this time. However, habitat actions identified for the Pahsimeroi River and Lower Salmon Mainstem Chinook populations should also benefit the Pahsimeroi River steelhead population. These actions are listed in Table 5.3-48. Costs associated with these actions have been accounted for in the recovery plan subsections on Pahsimeroi River Chinook salmon and Lower Salmon Mainstem Chinook salmon. The habitat cost estimate for the Pahsimeroi River steelhead population is therefore zero.

Hatchery Recovery Strategy and Actions

[to be added]

Harvest Recovery Strategy and Actions

[to be added]

Table 5.3-48. Recovery Actions Identified for the Pahsimeroi River Steelhead Population.

Recovery Actions Identified for the Pahsimeroi River Steelhead Population.						
Natal Habitat Recovery Actions [Actions identified for spring/summer Chinook but will also benefit steelhead.]						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020
Pahsimeroi River and tributaries downstream from Hooper Lane	Low flow in Pahsimeroi River mainstem	Increase flow	Additional flow enhancement of 15 CFS (35.5 cfs is already underway)	$15(1.983) = 29.75 \text{ AF/D}(200 \text{ days}) = 5950 \text{ AF} \times \$21.00/\text{AF} = \$124,950 \text{ per year.}$	Additional flow enhancement for Pahsimeroi River and tributaries as necessary.	Minimum of \$124,950 per year. Depends on total flow necessary
	Disconnected tributaries	Reconnect tributaries	Reconnect 3 tributaries with potential spring/summer Chinook habitat to mainstem Pahsimeroi River.	3 Stream Reconnects (estimate 15 miles @ \$50,000 per mile = \$750,000.	Reconnect additional tributaries if necessary	Flow enhancement costs to be determined
	Sediment and riparian conditions	Reduce sediment by restoring riparian areas and function	Implement the Pahsimeroi TMDL. (5 projects underway improving 11 miles of riparian conditions)	CWA costs	Continue TMDL implementation as necessary	
	Migration barriers	Provide passage	Complete 10 barrier removal projects (6 projects underway creating access to 33.5 miles of habitat)	10 barrier removal projects or ditch consolidations @ 82,500 each = \$825,000.	Remove additional barriers if identified	Costs dependent on how many additional barriers are identified.
	Entrainment in ditches	Install screens	Install fish screens based on SHIPUSS priorities. (6 projects underway)	Need Cost	Install additional fish screens based on SHIPUSS priorities 3 projects	
Pahsimeroi River and tributaries upstream from Hooper Lane	Disconnected from lower mainstem Pahsimeroi River	Reconnect channel	Completion of IDWR streamflow studies to determine feasibility of reconnecting this reach.	Already funded		
Salmon River tributaries	Fish passage	Provide passage	Replace culvert on Iron Creek with a bridge.	\$30,000		
	Entrainment in ditches	Install screens	Install fish screen on Cow Creek diversion.			
Hatchery Recovery Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020

Recovery Actions Identified for the Pahsimeroi River Steelhead Population.						
Harvest Recovery Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020

5.3.6.11 East Fork Salmon River Steelhead Population

Abstract/Overview

The East Fork Salmon River steelhead population is tentatively rated as maintained with moderate risk because the surrogate population for A-run steelhead passing Lower Granite Dam is at moderate risk, based on recent abundance and productivity. Diversity risk is also moderate. The population is targeted to achieve the desired status of Maintained, which requires no more than moderate abundance/productivity risk and moderate spatial structure/diversity risk.

Current Status	Desired Status
Maintained	Maintained

The desired status for the East Fork Salmon River population suggests that no recovery plan actions directed specifically at this population are necessary. However, a conservative management approach should be pursued until population-specific data become available to more accurately describe the status of this population. Recovery actions in the Snake and Columbia Rivers migration corridor, and spawning and rearing habitat actions aimed primarily at spring/summer Chinook, will further reduce the risk for this population.

While current best available information indicates that this population has achieved its desired status, there is a high degree of uncertainty in estimating the population's current status, as well as the nature and timing of the population's response to various recovery strategies. Due to this uncertainty, it is important to use an adaptive management strategy, in conjunction with the ESA's five-year status reviews and the information in the Research, Monitoring, and Evaluation chapter. If new information shows that this population has not achieved its desired status, it is imperative to identify those actions that are most likely to yield additional improvement.

Introduction

This section of the recovery plan compares the population's desired status to its current status, and describes how the population fits into the recovery strategy for the MPG and DPS. The primary sources of information are the ICTRT viability criteria (NMFS 2007b) and the ICTRT's Snake River steelhead status assessment (ICTRT 2008).

Population Status

The Population Status section describes the population's current status as defined in the ICTRT's most recent status assessment (ICTRT 2008) where they discussed risk in terms of four viability parameters: Abundance, Productivity, Spatial Structure and Diversity. Other available information was also considered. The section focuses primarily on population Abundance (the total number of adults) and Productivity (the ratio of returning adults to the parental spawning adults). It compares the population's current status to the desired status in terms of both abundance and productivity. It also summarizes Spatial Structure (the amount and nature of available habitat) and Diversity (genetic traits) concerns identified by the ICTRT. More details are available in the Snake River steelhead status assessment (ICTRT 2008).

Population Description: The East Fork Salmon population is located upstream from the Pahsimeroi steelhead population and downstream from the Upper Mainstem Salmon River steelhead population. The ICTRT (2003) distinguished the East Fork Salmon River as a single independent population based

largely on distance from other spawning aggregates and genetic differentiation from other upper Salmon River samples. The current steelhead distribution in the East Fork Salmon River watershed includes portions of Herd, East Pass, Taylor, Germania, and West Pass Creeks, West Fork and South Fork of East Fork Salmon River, Little and Big Boulder Creeks, Big Lake Creek, and the East Fork Salmon River mainstem. The population also includes several mainstem Salmon River tributaries, including Bayhorse, Challis, Morgan, and Garden Creeks. Steelhead spawning in the mainstem Salmon River, from the East Fork confluence to the Pahsimeroi River confluence, if it occurs at all, constitutes an extremely small proportion of spawning in the total population.

A NMFS model of potential habitat for the Interior Columbia Basin, based on geomorphological characteristics, suggests that the historic distribution of steelhead could have included more tributaries and could have been more expansive than current distribution (NMFS 2006) (Figure 5.3-46). Access to some potential historic habitat is blocked by irrigation diversion structures and by reduced streamflow associated with seasonal water withdrawals.

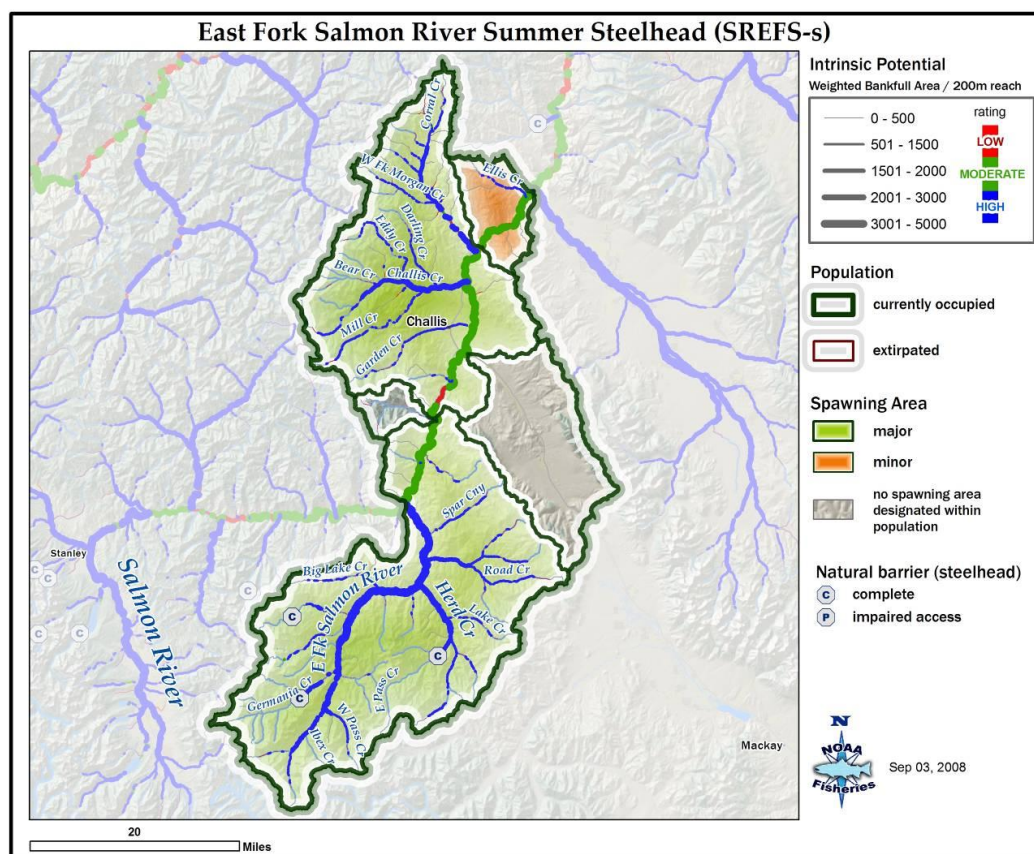


Figure 5.3-46. East Fork Salmon River steelhead population, with major and minor spawning areas.

The East Fork Salmon River population was historically an A-run population, but B-run hatchery steelhead have been released into the population for harvest augmentation and to supplement the natural population. A satellite facility to the Sawtooth Fish Hatchery is located on the East Fork, 18 miles upstream from the river's mouth. Other tributaries in the population, such as Morgan and Challis Creeks, also have an extensive history of hatchery fish stocking, including A-run and B-run steelhead (IDFG 2007, draft).

The ICTRT classified the East Fork Salmon River population as “intermediate” in size and complexity based on historical habitat potential (ICTRT 2007). A steelhead population classified as intermediate has a mean minimum abundance threshold of 1,000 natural-origin spawners with sufficient intrinsic productivity (≥ 1.14 recruits per spawner at the minimum abundance threshold) to achieve a 5 percent or less risk (“low risk”) of extinction over a 100-year timeframe. For the East Fork Salmon River population to achieve a 25 percent or less risk (“moderate risk”) of extinction over 100 years, abundance and productivity targets are somewhat lower.

Abundance and Productivity: Current abundance is unknown for this population. However, there is a natural abundance time series for a small portion of the population. A weir is located on the East Fork Salmon River approximately 20 miles upstream of the river’s mouth, and has been operated to trap adult steelhead since 1984. Figure 5.3-47 shows numbers of natural-origin steelhead trapped at the weir. From 1990 to 2001, hatchery-origin steelhead were also released above the weir, to supplement the natural population, ranging from 96 individuals in 1990 to 2 individuals in 2001. A review of IDFG hatchery brood year reports for steelhead brood years 1994-2002 revealed that hatchery personnel had classified all natural-origin returns for those years as B-run fish. The East Fork Salmon River hatchery program was founded from Dworshak Hatchery (Clearwater River) B-run stock, indicating that the natural origin steelhead in Figure 5.3-47 may have originated from hatchery stock.

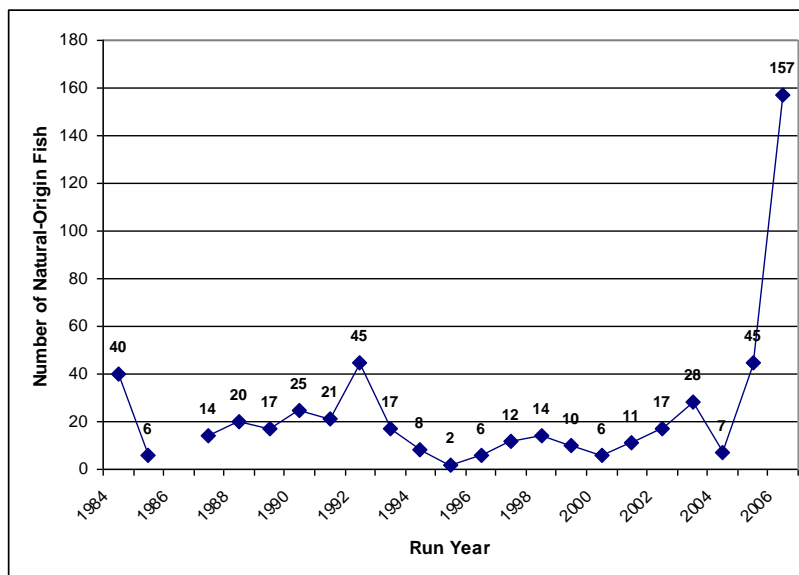


Figure 5.3-47. Numbers of natural-origin steelhead trapped at the East Fork Salmon River weir, 1984-2006. Fish returning in at least the years 1994-2002 were classified as B-run, not the native A-run. From 1990 to 2001, some hatchery-origin steelhead were also released above the weir, ranging from 96 individuals in 1990 to 2 individuals in 2001.

As shown in Figure 5.3-47, natural-origin returns to the weir dropped to very low levels in the mid-1990s, followed by an increase to previous levels through 2003. Returns in 2005 and 2006 were high relative to other years in the series. IDFG also collects juvenile abundance data at up to three transects per year in the East Fork Salmon River drainage. Juvenile abundance peaked in the late 1980s, followed by a decline through the mid-1990s. Parr counts returned to the levels observed in the mid-1980s, then dropped off in 2004 and 2005. Outside of the East Fork drainage, recent IDFG surveys have documented spawners in the Morgan Creek and Challis Creek drainages. In 2006, 72 adult

steelhead were captured at a temporary weir in Challis Creek and 66 adult steelhead were captured at a weir in Morgan Creek. However, these adults were overwhelming hatchery-origin fish, with only six of the Challis Creek and two of the Morgan Creek steelhead determined to be natural-origin (IDFG 2007 draft).

Because population-specific abundance estimates are not available for most Snake River steelhead populations, the ICTRT generated preliminary estimates of average population abundance and productivity using annual counts of wild steelhead passing Lower Granite Dam. Estimates were developed for two average surrogate populations to represent both major run types (A and B). These abundance and productivity estimates were then compared to a viability curve for an intermediate-sized Snake River steelhead population (requiring a minimum abundance threshold of 1,000 natural-origin spawners and a productivity of 1.14 recruits per spawner).

The surrogate population for A-run steelhead above Lower Granite Dam has an estimated recent abundance of 556 and productivity of 1.86. It is rated at moderate risk based on current abundance and productivity, as shown in Figure 5.3-48 (25% or less risk of extinction over a 100-year timeframe). Although the current estimate of intrinsic productivity is above the minimum threshold for low risk, the current average natural abundance (recent 10-year geometric mean) is well below the ICTRT minimum threshold value of 1,000. More specific information about how the abundance and productivity estimates were calculated is included in the ICTRT's steelhead status assessment, Appendix B-1 *Calculating Representative Abundance and Productivity Estimates for Snake River A and B-run Steelhead Populations*.

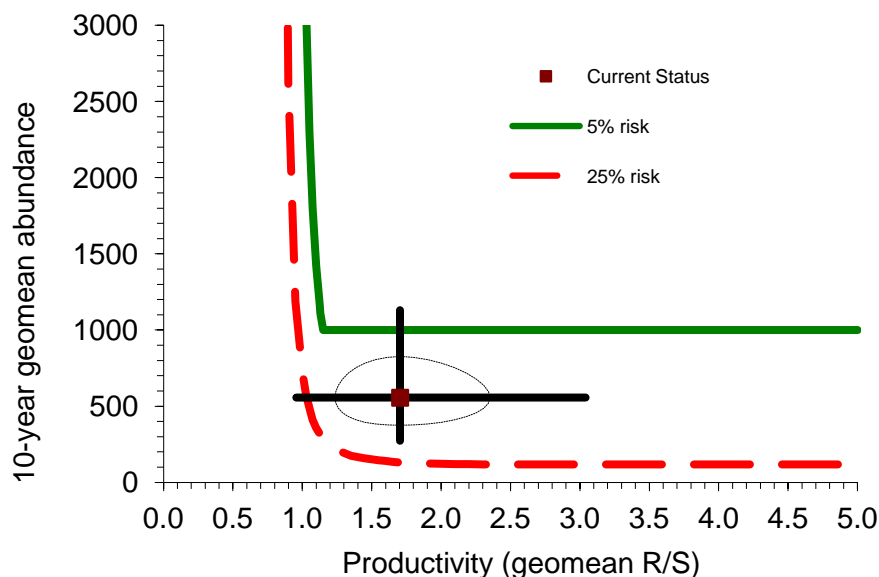


Figure 5.3-48. Snake River A-run surrogate steelhead population current estimated abundance and productivity (A/P) compared to DPS viability curve (1986-2005). Ellipse = 1 SE about the point estimate. Error bars = 90% CI for A, 98% CI for P (if point estimate >1% risk curve, the uncertainty test is <1% probability the combined A/P is at high risk).

Based on the surrogate A-run population, the ICTRT gave this population a tentative abundance/productivity rating of moderate risk. However, it is unknown whether native A-run fish are currently occupying the East Fork below the weir or tributaries to the main Salmon River.

Furthermore, limited data suggest that natural-origin returns to the Challis-Morgan major spawning area are extremely low. The surrogate A-run population may therefore overpredict current abundance for this population. Increased monitoring of the population is necessary to increase the certainty of this risk rating.

Spatial Structure: The ICTRT has identified two major spawning areas (East Fork and Challis/Morgan) and one minor spawning area (Ellis Creek) within this population. No systematic surveys have been conducted to delineate the distribution of spawning across the population. However, returning adults have been documented in the East Fork, Morgan Creek, and Challis Creek, and spawning use of Salmon River tributaries can be inferred from juvenile steelhead presence/absence surveys and databases. Because both major spawning areas are occupied, this population has a very low spatial structure risk. A very low spatial structure risk is sufficiently low for the population to attain its overall desired status.

Diversity: The diversity risk for this population is largely driven by the effects of hatchery fish on the population. Current hatchery supplementation and harvest augmentation programs in the upper Salmon River basin provide substantial opportunity for hatchery-origin fish to spawn naturally in the population. These hatchery programs release marked steelhead smolts within and upstream of the East Fork population boundaries. Stocks used in these programs were founded from both local and out-of-MPG stocks. Some returning hatchery fish are not harvested in fisheries and do not recruit back to weirs or traps, and are thus assumed to be spawning naturally in the population, creating a diversity risk for the natural population.

The only within-population hatchery program is a current supplementation program targeting natural East Fork Salmon River steelhead, operated out of the East Fork satellite facility to the Sawtooth Fish Hatchery. There is a high degree of uncertainty with respect to program success and overall effects on the population's diversity. The historic population is classified as consisting only of A-run steelhead, but recent management actions have been aimed at developing a natural B-run component originally derived from Dworshak Hatchery stock. The shift from A-run timing to B-run timing for a major portion of the population creates a diversity risk through the potential loss of a historic life-history strategy.

The presence of hatchery fish in this population leads to a moderate cumulative diversity risk, which is adequate for the population to reach its desired status.

Summary: The East Fork Salmon River steelhead population is currently at moderate risk due to a tentative moderate risk rating for both abundance/productivity and diversity. A population-specific monitoring program is necessary to reduce the uncertainty of this rating. Table 5.3-49 shows the population's current and desired status (both maintained) in terms of cumulative abundance/productivity and spatial structure/diversity risks. A complete version of the ICTRT's draft status assessment for Snake River Basin steelhead populations is available upon request from NMFS.

Table 5.3-49. East Fork Salmon River population risk ratings integrated across the four viable salmonid population (VSP) metrics.

		Spatial Structure/Diversity Risk			
		Very Low	Low	Moderate	High
Abundance/ Productivity Risk	Very Low (<1%)	HV	HV	V	M
	Low (1-5%)	V	V	V	M
	Moderate (6 – 25%)	M	M	M East Fork Salmon River	HR
	High (>25%)	HR	HR	HR	HR

Viability Key: HV – Highly Viable, V – Viable, M – Maintained, and HR – High Risk; shaded cells – do not meet viability criteria, with darkest cells signifying the highest risk of extinction. Percentages refer to risk of extinction over 100 years. Arrow points to desired risk status.

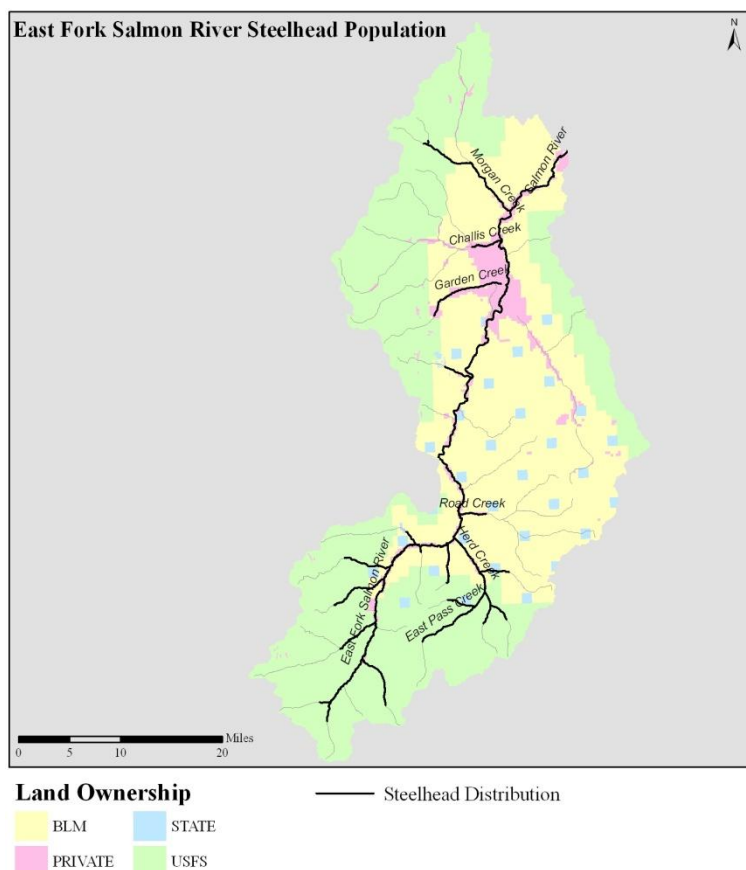
This population is estimated to be currently meeting its desired status of maintained with moderate risk, so no recovery plan actions directed specifically at this population are necessary at this time. However, the following sections on limiting factors and recovery strategies are included for several reasons. Considerable uncertainty is involved in achieving the desired status for all of the populations within the Salmon River MPG, so further reducing the risk status for the East Fork Salmon River population could provide flexibility for meeting the delisting goal for the MPG. Due to lack of population-specific abundance and productivity data, there is also uncertainty associated with the conclusion that the East Fork Salmon River population is currently meeting its desired status. Finally, further reducing the extinction risk for this population could be necessary for meeting goals beyond compliance with the Endangered Species Act, such as additional harvest by the state of Idaho or interested tribes.

Limiting Factors and Threats Specific to Population

This section describes the limiting factors and threats that are specific for the population. The population is also affected by limiting factors and threats in the mainstem Columbia/Snake River corridor, estuary, and plume, and by climate change. Section 5.1.1 summarizes regional-level factors that affect all Idaho Snake River steelhead populations.

Natal Habitat

Habitat Conditions: The East Fork Salmon River steelhead population geographic boundary drains approximately 1,273 square miles. Elevations range from approximately 5,500 feet to almost 12,000 feet at the highest peaks. Precipitation is influenced by these topographic extremes with approximately 10 inches falling at the lower elevations to as much as 50 inches at higher sites (Molnau 2000). The majority of precipitation falls as winter snow, with dry summers and occasional spring and fall rains. Peak streamflows are associated with winter snowmelt and occur in late spring and early summer. Due to variability in precipitation and air temperature, mean daily streamflow values are also highly variable and flashy. Annual minimum flows usually occur in September.



Steelhead Distribution Data: StreamNet Generalized Fish Distribution - Summer Steelhead, Pacific Northwest (Updated February 2009), StreamNet Project, Portland, Oregon.

Figure 5.3-49 Land ownership in the East Fork Salmon River steelhead population.

Land ownership within the East Fork Salmon steelhead population is mostly USFS (50%) and BLM (43%). Private (5%) and state of Idaho (2%) make up a smaller portion of ownership in the population. USFS lands occupy the upper benches and higher elevation forested lands (Figure 5.3-49). BLM lands are generally the low to mid elevation lands. The valley bottom lands are a mix of private, BLM and state ownership, adjacent to much of the mainstem East Fork Salmon River and Salmon River. Public lands are used for livestock grazing, timber, recreation, and a variety of other public uses. Private land management is mostly irrigated agriculture and livestock grazing in the valley bottoms.

The East Fork Salmon River watershed has been degraded from its historic condition. The predominant land use is ranching and cattle grazing, although mining and dispersed recreation occur as well. Sedimentation, bank instability and loss of riparian vegetation due to livestock

grazing, channel alterations (from roads and riparian conversion), and irrigation diversions have all reduced the productivity of the lower East Fork Salmon River and its tributaries Herd and Road Creeks (USFS 2003, p. III-128). Mineral exploration and mining were prevalent in most drainages following the discovery of gold in 1860. Mining activity declined at the beginning of the 20th century with a small resurgence in the 1930s. Big Boulder Creek supported the most intensive mining, and stream habitat has been influenced greatly in that drainage through channelization and sedimentation (USFS 2003). Mine and tailing reclamation was completed in 2008 in an effort to reduce these legacy effects. There are approximately ten public land grazing allotments in the East Fork Salmon watershed and grazing occurs on the majority of lands. Road densities are low and generally do not exceed one mile of road per square mile, although roads encroach on stream channels and riparian areas at local sites, contributing to channel instability and sedimentation.

Although much of the habitat in this population is degraded, the headwaters of the East Fork Salmon are in near pristine condition, falling within the Railroad Ridge roadless area and the proposed White Cloud-Boulder wilderness area (USDA 2003, p. III-125). There are about 773 km (480 miles) of potential stream habitat for steelhead below natural barriers of the total 938 km (583 miles) of stream within the boundaries of the population (ICTRT 2009). Documented spawning and rearing for steelhead occurs in the upper East Fork Salmon River and its tributaries along with the Salmon River

tributaries Bayhorse, Challis, and Morgan Creeks. About 60 percent of the intrinsic spawning habitat potential is contained within the East Fork Salmon River major spawning area (Figure 1).

IDEQ's Integrated (303(d)/305(b)) Report identifies stream segments in this population that are not fully supporting their assessed beneficial uses under the Clean Water Act. Table 5.3-50 shows these impaired stream segments listed in the report, section 5 (impaired waters that need a TMDL), section 4c (waters impaired by non-pollutants), and section 4a (impaired waters that have an EPA-approved TMDL) (IDEQ 2009).

Table 5.3-50. Stream segments in the East Fork Salmon River steelhead population identified from sections 4a, 4c, and 5 of the IDEQ 2008 303(d)/305(b) integrated report (IDEQ 2009).

Waterbody	Impairment/Cause	Stream Miles
Section 5- Impaired Waters Needing a TMDL		
Salmon River Tributaries - Pennal Gulch to Pashsimeroi River	Combined Biota/Habitat Bioassessments*; Fecal Coliform	93.31
Challis Creek - Darling Creek to mouth	Water temperature	3.42
Challis Creek - Bear Creek to Darling Creek	Water temperature; Cause Unknown	1.5
Garden Creek - source to mouth	Sedimentation/Siltation; Cause Unknown	12.74
East Fork Salmon River - Germania Creek to Herd Creek	Combined Biota/Habitat Bioassessments	59.91
Big Lake Creek - source to mouth	Combined Biota/Habitat Bioassessments	2.3
Road Creek - source to Corral Basin Creek	Combined Biota/Habitat Bioassessments	2.9
Mosquito Creek - source to mouth	Combined Biota/Habitat Bioassessments	12.42
Warm Spring Creek - Hole-in-Rock Creek to mouth	Sedimentation/Siltation; Cause Unknown	4.29
Warm Spring Creek - source to Hole-in-Rock Creek	Sedimentation/Siltation; Cause Unknown	116.43
Broken Wagon Creek - source to mouth	Sedimentation/Siltation; Cause Unknown	47.96
Section 4c-Waters Impaired by Non-pollutants		
Challis Creek - Darling Creek to mouth	Low flow alterations	3.42
Challis Creek - Bear Creek to Darling Creek	High Flow Regime; Low flow alterations; Other flow regime alterations; Physical substrate habitat alterations	4.94
Road Creek - source to Corral Basin Creek	Other flow regime alterations	31.93
Section 4a- Impaired Waters with EPA-Approved TMDLs		
Challis Creek - Darling Creek to mouth	Sedimentation/Siltation	3.42
Challis Creek - Bear Creek to Darling Creek	Sedimentation/Siltation	6.44

*The combined biota/habitat bioassessment cause is assigned to a waterbody on the 303(d) list (Category 5 of the integrated report) when bioassessment scores indicate poor habitat and/or aquatic community conditions and there is insufficient information to determine the cause(s) of the poor bioassessment scores.

Current Habitat Limiting Factors: NMFS determined the habitat limiting factors by reviewing multiple data sources and reports on stream conditions. Based on reports and discussions with local fisheries experts and watershed groups, NMFS concluded that the habitat limiting factors for the East Fork Salmon steelhead population are passage barriers and juvenile fish entrainment, reduced streamflow,

and poor riparian conditions. Table 5.3-51 summarizes the mechanisms by which each limiting factor affects steelhead, and the management objectives for addressing each limiting factor. The following section discusses each of the limiting factors using information from IDEQ, the Salmon Subbasin Assessment and Management Plan, and the Idaho Model Watershed Plan (IDEQ 2001, IDEQ 2009, ISSC 1995, NPCC 2004, Ecovista 2004).

Table 5.3-51. Primary limiting factors identified for the East Fork Salmon steelhead population, mechanisms by which each limiting factor affects salmonids, and management objectives for addressing each limiting factor.

Limiting Factors	Effects on Salmonids	Management Objectives to Address Limiting Factors
Migration Barriers	Migration barriers such as dams, culverts, and dewatered stream sections can create fish passage barriers. These barriers reduce or eliminate movement of adult and juvenile salmon within a watershed ultimately reducing potential spawning and rearing habitat.	Correction or removal of fish passage barriers.
Entrainment	Juvenile fish entrainment occurs through unscreened irrigation diversions. Young salmon are at risk when they are diverted into canals or diversion ditches.	Eliminate entrainment through actions that prevent the loss of fish in irrigation diversion systems.
Stream Flow	Low stream flows reduce available habitat, can exacerbate high stream temperature conditions, and in extreme conditions can create barriers to migrations or movement (dry stream channels).	Water quantity restoration actions to improve instream flow and stream connectivity.
Riparian Condition	Poor riparian conditions reduce habitat quality, streambank stability (sediment and channel condition), shade (stream temperature), and LWD recruitment (habitat complexity and pool formation).	Riparian restoration to increase habitat complexity and LWD recruitment.
Temperature	High stream temperatures affect salmonid growth and development, alter life history patterns, induce disease, or exacerbate competitive predator-prey interactions. High stream temperature can also be lethal to both adult and juvenile salmon.	Riparian restoration actions to improve shade and stream cover to reduce stream temperature.
Sediment	Excess sediments can reduce juvenile habitat (rearing), aquatic insect availability (food), and spawning and incubation success (reproduction).	Riparian restoration to stabilize streambanks and reduce sedimentation to the stream.

1. Migration Barriers.

Most artificial migration barriers are small dams, culverts, and irrigation withdrawals. For the East Fork Salmon River population, migration barriers are reducing abundance and productivity and may have a minor effect on the population's spatial structure.

Passage barriers were rated as having a moderate to high influence on habitat quantity and quality in the East Fork Salmon River (NPCC 2004, p. 3-16). Most barriers are associated with water diversions. The Idaho Model Watershed Plan (ISCC 1995) noted that two diversions historically hindered adult migration in Herd Creek but that those barriers have now been eliminated by local watershed groups and IDFG. Also in Herd Creek, IDEQ (2003) reported that fish passage is blocked 0.5 miles above the Lake Creek confluence. The Idaho Model Watershed Plan reported numerous irrigation diversions throughout the East Fork watershed that present problems to juvenile outmigration through fish entrainment (ISCC 1995). In the East Fork Salmon River from Herd Creek to Germania Creek the majority of the irrigation ditches are screened. However, the EF-16 diversion screen is ineffective and EF-13 and EF-6a ditches are unscreened; these three diversions continue to entrain fish when in operation (Personal Communication, P. Murphy, IDFG—Fisheries Biologist, February, 2008). In West Pass Creek there are three unscreened irrigation diversions near the mouth (WP-1, WP-2, and WP-3) that could reduce juvenile steelhead outmigration. One unscreened diversion also occurs in the Upper East Fork Salmon River (EF-30). There is a diversion on Bowery Creek, in the upper East Fork drainage, that may preclude fish migration in most years (BLM 1999).

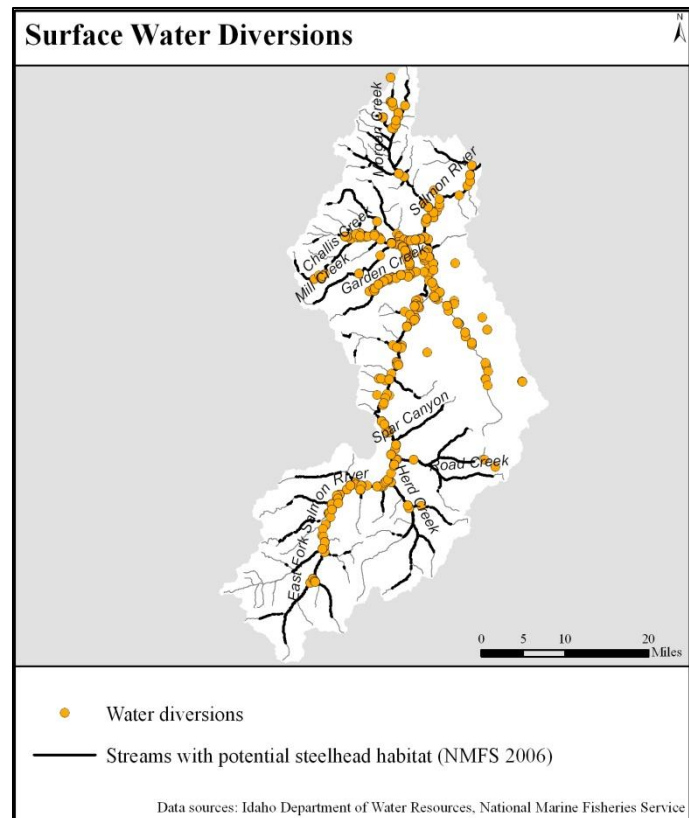


Figure 5.3-50. Surface water diversions in the East Fork Salmon River steelhead population.

Passage barriers also exist in tributaries to the mainstem Salmon River within this population, including Challis Creek and Morgan Creek. As shown in Figure 5.3-50, numerous irrigation diversions take water from the small subwatersheds that drain directly into Salmon River. During the irrigation season some of these streams become dewatered, creating passage barriers and reducing habitat connectivity (IDEQ 2003).

2. Entrainment.

Many diversions on the mainstem Salmon River and mainstem East Fork Salmon River are screened, but most diversions on tributaries remain unscreened. As depicted Figure 5.3-50, the number of irrigation withdrawals indicates that the risk of entrainment is present throughout much of the population. The Idaho Fish Screen Program builds and maintains screens through a cooperative program funded by NMFS and Bonneville Power Administration. IDFG constructs and maintains the screens in cooperation with local water users.

3. Reduced Flow During Critical Periods.

For steelhead, reduced streamflows caused by irrigation withdrawals are most likely to reduce the quantity and quality of juvenile rearing habitat. Adult steelhead typically spawn near the peak of the

hydrograph and are not as likely to be impacted by low flows, but can be impacted by diversion structures that hinder fish passage.

As shown in Figure 5.3-50, surface water is diverted throughout the East Fork Salmon River drainage and throughout many of the Salmon River tributaries in this population. Challis Creek and Road Creek (a tributary to the lower East Fork mainstem) were 303(d)-listed for flow alteration by IDEQ (Table 6), but many other streams in the population are impacted by low flows. Seasonally dewatered stream sections from irrigation diversions are known to occur in Challis, Road, and Morgan Creeks, blocking access to upstream habitat. There are numerous diversions for irrigation on Challis Creek that dry the stream channel, disconnecting Challis Creek from the main Salmon River in some years (IDEQ 2003). The lower three miles of Road Creek pass through private land, and irrigation diversions dewater Road Creek for much of the irrigation season. On Morgan Creek, there is a large diversion in the headwaters, above Corral Creek, that dewater a portion of Morgan Creek (IDEQ 2003). These three streams all have high intrinsic habitat potential for steelhead spawning and rearing (see Figure 5.3-51).

4. Degraded Riparian Conditions.

Conditions reported for the East Fork Salmon River steelhead population suggest that riparian conditions are reducing the abundance and productivity of steelhead. Altered riparian habitat has been rated as having a moderate-to-high influence on salmonid habitat quality for all reaches of the East Fork Salmon River and Salmon River tributaries (NPCC 2004, p. 3-14 and 3-16). Some of the stream reaches most influenced by altered riparian habitats are the East Fork Salmon River from Herd Creek to Germania Creek and Herd Creek and its tributaries. Degradation of riparian areas has been identified as the primary factor contributing to increased temperatures, sedimentation, and unstable streambanks (Ecovista 2004, p. 62). The USFS has speculated that pool habitat in the East Fork from the mouth upstream to Herd Creek is below natural conditions because of the loss of historic cottonwood galleries (USDA 2003, p. V-9). Trapani (2002) found that pool habitat represented just 6.4 percent of this reach's length. Pool habitat was also fairly low (15%) in the East Fork Salmon River from Herd Creek to Little Boulder Creek. For both reaches, Trapani (2002) recommended a reduction of impacts to riparian areas associated with agriculture and development. Restoration of riparian areas in Challis Creek is also a key feature in reduction of sediments (IDEQ 2007).

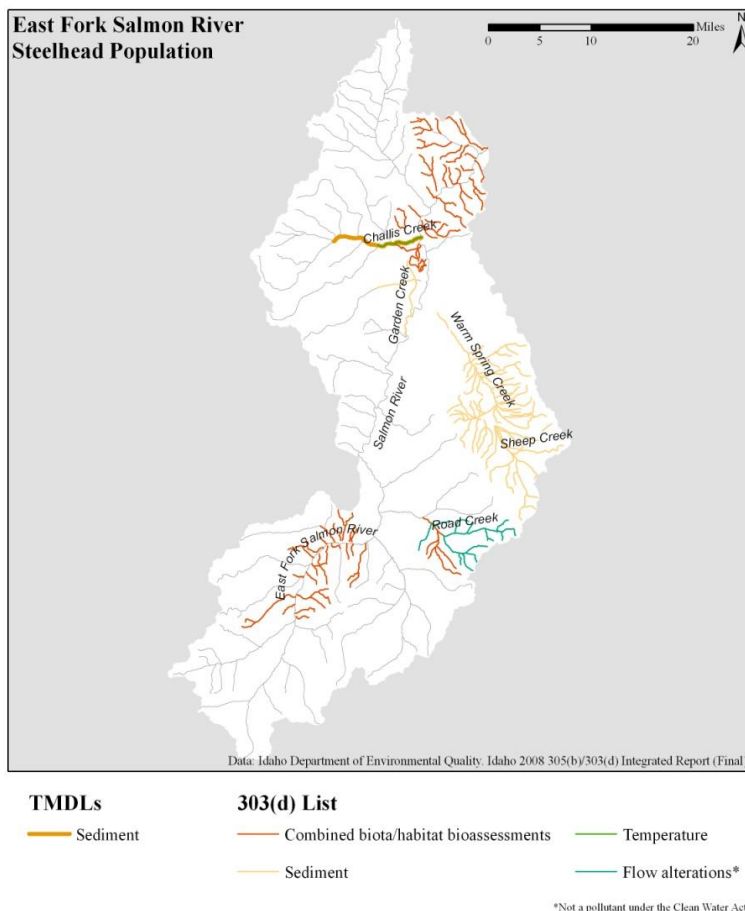


Figure 5.3-51. Stream segments in the East Fork Salmon River steelhead population identified from Sections 4a, 4c, and 5 of the IDEQ 2008 303(d)/305(b) integrated report (IDEQ 2009).

5. *Excess Sediment.*

Conditions reported for the East Fork Salmon River steelhead population suggests that sediment is reducing abundance and productivity of steelhead. IDEQ has determined that some stream reaches in the Challis, Garden, Warm Spring, and Broken Wagon Creeks drainages are impaired by excess fine sediments (Figure 5.3-51). Sampling in Challis Creek by the Environmental Science and Research Foundation (ESRF), using McNeil Core samples, found that subsurface fines exceeded 40% (IDEQ 2003). Stream bank erosion rate estimates and road erosion estimates made by ESRF also indicated that Challis Creek had one slightly eroding reach, three moderately eroding reaches and one severely eroding reach. These findings were validated by IDEQ who also identified a large landslide below Mosquito Flats Reservoir as a significant sediment source (IDEQ 2003). Sediment levels in Challis Creek appear to be improving with subsurface fines decreasing from 44.1 to 21.3 percent between 1995 and 1999 (IDEQ 2003).

IDEQ developed a TMDL for sedimentation/siltation for Challis Creek, approved by the Environmental Protection Agency. Sediment sources for Challis Creek appear to be related to stream bank and road erosion. IDEQ (2003) suggested that to improve the quality of spawning substrate and rearing habitat in Challis Creek, it would be necessary to reduce the component of subsurface fine sediment less than 6.35 mm in size to less than 28 percent. IDEQ set a target of 80 percent stream bank stability in order to decrease stream bank erosion. IDEQ (2007) further recommended that existing sediment from streambank erosion be reduced by 36 percent. Reduction in source sediment from roads and streambanks is needed on both public and private lands.

Garden Creek, Warm Spring Creek, and Broken Wagon Creeks have been 303(d)-listed for sedimentation. Sediment levels for Garden Creek, however, appear to be trending downward, with subsurface fines dropping from 22.4 to 18.0 percent (IDEQ 2003). Warm Spring Creek and Broken Wagon Creek are within the Warm Spring Creek drainage. Warm Spring Creek is geothermal, and water temperatures exceed 20°C and would not likely support cold water biota (IDEQ 2003). Historically, flow from Warm Spring Creek infiltrated into the substrate and did not reach the Salmon River as surface water. Currently, the stream is diverted for aquaculture of warm water species and is unlikely to be a significant source of sediment to any spawning and incubation areas of steelhead. Sediment levels are elevated in the Herd Creek watershed, a major tributary drainage to the East Fork. The Idaho Model Watershed Plan (ISCC 1995) noted elevated sediment levels in spawning and incubation areas of Herd Creek. A USFS watershed analysis on Herd Creek indicated excess sediment in some areas of the watershed, with percent fine sediment in spawning gravel between 20 and 35 percent. In 2001, fine sediment in East Pass Creek ranged from 27.1 to 38.3 percent and Herd Creek below East Pass Creek confluence ranged from 28.4 to 32.5 percent (USFS 2001). Fine sediment levels in West Fork Herd Creek varied from 20.4 to 27.2 percent. The USFS standard for fine sediment less than 6.35 mm at depth in the Challis zone of the Salmon-Challis National Forest is 30 percent.

Sediment levels are also high in the East Fork Salmon River mainstem. The Idaho Model Watershed Plan (ISCC 1995) indicated that some improvements in sediment levels were needed in spawning and incubation areas in the East Fork between Herd Creek and Germania Creek. Trapani (2002) estimated that 34 percent of the streambank along this reach was unstable (with approximately 5% of the stable streambank consisting of riprap) and that cobble embeddedness was 26 percent. In the East Fork Salmon River downstream from Herd Creek, Trapani (2002) estimated that cobble embeddedness was 41 percent, likely due to bank instability within and upstream of this lower reach. NMFS (1996)

standards consider cobble embeddedness > 30 percent to be “not properly functioning” as salmonid habitat, and embeddedness of 20 to 30 percent to be “functioning at risk.” Based on these standards, substrate in the lower section of the East Fork Salmon River is “not properly functioning,” and substrate in the East Fork from Herd Creek to Germania Creek is “functioning at risk.”

In the East Fork Salmon River drainage, the Livingston Mine on Big Boulder Creek has affected the mainstem East Fork river channel by delivering large amounts of sediment downstream (NPCC 2004, USRITAT 1998). A dam built on Big Boulder Creek in the 1930s for power generation blocked fish migration for many decades until it was removed in 1991 (USDA 2003, p. V-8). A blow out of Big Boulder Creek, which mobilized mine tailings, was likely one of the largest sediment sources in the East Fork watershed in recent years. This event contributed to increased fines in Big Boulder Creek as well as lower portions of the East Fork Salmon River, although sediment levels appear to have stabilized (USDA 2003, p. V-8).

6. Elevated Water Temperatures.

Conditions reported for the East Fork Salmon River steelhead population suggest that elevated temperature is reducing abundance and productivity of steelhead. In the East Fork Salmon River watershed stream temperature has been rated as having a moderate-to-high influence on habitat quality (NPCC 2004, p. 3-16). Temperature data collected by BLM from 1995 to 1999, reviewed by IDEQ (2003), suggested that high stream temperatures occur within some East Fork Salmon River tributaries. For example, in 1996 Lower Horse Basin Creek and Road Creek below Horse Basin Creek had maximum temperatures of 23.6°C and 22.9°C, respectively. In 1998, Big Lake Creek had a maximum water temperature of 22.9°C. Similarly, unpublished BLM temperature data for Herd Creek, measured at Spring Gulch upstream of the irrigation diversions, showed an average 7-day max temperature of 20°C for 1999-2006 observations (Personal Communication, C. Tipton, BLM-Fisheries, October, 2007). BLM data recorded at the mouth of the East Fork Salmon River showed an average 7-day maximum temperature of 18.8°C from 2001 to 2006. Water temperatures exceeding 17.8° C are considered “not properly functioning” for salmonid rearing under NMFS (1996) criteria. Elevated stream temperatures may be due to livestock grazing in riparian areas and to irrigation diversions, which both decrease streamflow and contribute warm return flows.

In the main Salmon River section of this population, temperature has been rated as having a moderate influence on habitat quality (NPCC 2004, p. 3-14). Stream temperature data for the Salmon River tributaries Bayhorse, Morgan, and West Fork Morgan Creeks showed that aquatic life temperature standards were only exceeded in Morgan Creek in 1998 (22.5°C maximum temperature) (citation?). Challis Creek is identified on the 303(d) list for stream temperature impairment (Table 6).

Summary of Current Habitat Limiting Factors and Threats

Habitat limiting factors within the East Fork Salmon River steelhead population are passage barriers, entrainment, stream flow, sediment and temperature. Sediment and Temperature are linked to degradation of riparian conditions and to irrigation withdrawals that degrade water quality (by increasing sediment and temperature) and reduce water quantity. The highest priorities for habitat for this population are removing barriers and reconnecting tributaries that are disconnected from mainstem rivers by water withdrawals, eliminating entrainment in ditches and increasing stream flows. The second tier of priorities is to improve riparian conditions and decreasing sediment and temperature concerns. Finally, improvements to channel structure should also be considered.

Potential Habitat Limiting Factors and Threats: Several potential concerns have not yet risen to the level of a limiting factor or threat, but should be managed to protect steelhead habitat in the East Fork Salmon River population area and allow any degraded habitat to recover.

1. Reduced water quality from new mineral exploration and development. Without sufficient water quality conservation measures, new mining operations could release sediment and toxic chemicals into surface waters.
2. Habitat degradation due to noxious weeds. The spread of noxious weeds can increase soil erosion and decrease native plant density.
3. Habitat degradation from off-highway vehicle use. Unrestricted access and increasing use of OHV's on public land is leading to increased habitat degradation.
4. Loss of floodplain connectivity and function from development. Development in the floodplain and along riparian areas in the East Fork Salmon remains a threat, as evidenced by Idaho Department of Water Resources data identifying 20 new groundwater well applications from 1996 to 2005 within the 100-year floodplain. Custer County and private parties should work with resource specialists to ensure that future developments maintain existing floodplain and riparian processes where they are properly functioning and allow for the long-term recovery of these processes where they are currently impaired.

Hatchery Programs

[To be developed]

Harvest Management

[To be developed]

Recovery Strategies and Actions

The recovery strategies that address a limiting factor may include both short-term and long-term actions. Short-term actions are projects scheduled to be implemented within the next ten years by a resource management agency or local stakeholder group. Long-term actions are categories of actions that could increase productivity for the population, but for which a specific project has not yet been proposed by a resource management agency or other stakeholder.

Natal Habitat Recovery Strategy and Actions

Priority stream reaches: The Upper Salmon Basin Watershed Project implementation group created a list of priority stream segments for salmonid habitat improvement projects (USBWP 2005). This prioritization report, Screening and Habitat Improvement Prioritization for the Upper Salmon Subbasin (SHIPUSS), considered multiple species, including spring/summer Chinook, steelhead, and bull trout. Despite including other species, the SHIPUSS prioritization overlaps considerably with habitat that has intrinsic potential for steelhead and is therefore transferable to this recovery plan. The SHIPUSS priority stream reaches are shown in Figure 5.3-52. Under SHIPUSS, Priority I streams are those streams that have the potential to realize immediate, tangible benefits to fish if recovery efforts are directed toward them. Priority II streams are those streams that will also see tangible benefits to fish as

a consequence of recovery projects, but where the benefits may be less substantial or may be delayed for quite some time (USBWP 2005).

Habitat actions: The following habitat action within the East Fork Salmon population, ranked in priority order, are intended to improve productivity rates and increase the effective capacity for natural smolt production in the watershed.

1. Screen irrigation diversions and provide passage at artificial barriers. One of the highest priorities is to appropriately screen all irrigation diversions so that fish do not become entrained in ditches and to eliminate passage barriers associated with diversions. Existing entrainment issues should be addressed first, followed by passage barriers blocking access to stream reaches with the greatest potential for steelhead recolonization. Projects should be scheduled within the context of the priorities set by the IDFG Screen Shop for the entire upper Salmon River Basin.

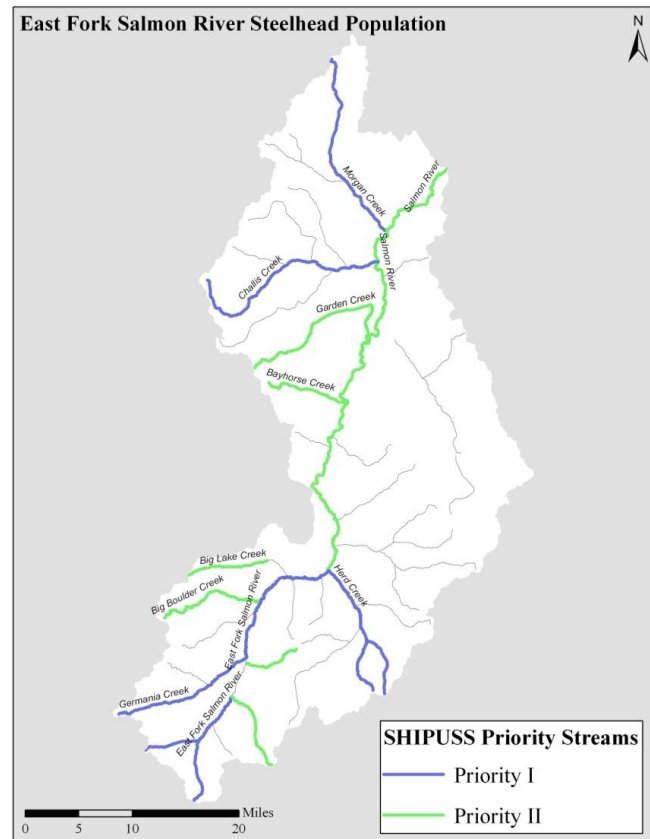


Figure 5.3-52. Priority streams for the East Fork Salmon River Steelhead Population.

Although steelhead are currently distributed across much of the historical range of the population, partial and complete passage barriers block access to some habitat. Increased spatial distribution could increase the population's abundance. Therefore, we recommend an assessment of potential passage blockages in the population and subsequent replacement or elimination of identified barriers to steelhead. Both structural barriers and irrigation-related dewatering barriers are thought to be present. The mainstem East Fork Salmon River should be the primary focus for this effort. West Pass Creek, Big Boulder Creek, Road Creek, and Lake Creek in the East Fork drainage, and Challis Creek and Morgan Creek on the mainstem Salmon, are the second priority. These tributaries have intrinsic potential habitat that may be inaccessible to steelhead due to migration barriers. Streams with steep gradients that naturally block steelhead should not be targeted under this recovery plan for removal of man-made fish passage barriers.

2. Restore instream flows. Another high priority is to increase flows in the mainstem East Fork Salmon River, Herd Creek, and other tributaries in this population. Instream flow improvements through irrigation diversion lease agreements, diversion consolidation, and modification of water conveyance or application could all be used to increase streamflows, with immediate benefits to this population. Projects should focus first on locations currently supporting spawning and rearing steelhead, with emphasis on areas supporting both salmon and steelhead. The mainstem East Fork Salmon River from Herd Creek to Germania Creek, Herd

Creek, and West Pass Creek currently meet these criteria. Efforts to improve streamflows in currently unoccupied historic habitat should receive secondary attention except where immediate opportunities can be capitalized on or where improvements would substantially benefit occupied habitat downstream.

3. Improve riparian conditions. A second priority is to improve riparian conditions, particularly in the mainstem East Fork Salmon River upstream of Herd Creek and in Herd Creek itself. Other focus areas include: Salmon River tributaries, West Pass Creek, West Fork Herd Creek, Lake Creek, Road Creek, Horse Basin Creek, and Corral Basin Creek. Increasing streambank stability will lead to improved riparian conditions, which will in turn help reduce elevated water temperatures that may currently reduce rearing success in this reach. Secondary treatment areas include the lower reach of the East Fork Salmon River (below the Herd Creek confluence) and Challis and Morgan Creeks on the Salmon River. Tertiary areas include East Fork tributaries (e.g. Lake Creek, Big Boulder Creek). IDEQ concluded in the neighboring Pahsimeroi basin that poor riparian habitat conditions and water quality issues are directly linked, such that an improvement in riparian conditions will likely lead to a reduction in stream temperatures and sediment levels (IDEQ 2001, p. 41). This logic applies equally well to the East Fork Salmon River and tributaries to the Salmon River.

Historic land use in the East Fork has disrupted the processes that form and sustain fish habitats, including sediment supply, woody debris recruitment, shading, and water delivery and storage. Thus, the improvement of fish habitat will require restoration of the watershed processes that have been disrupted. In the East Fork Salmon River this will require both active and passive restoration to recover riparian areas and thus stabilize banks and increase shade. Passive restoration opportunities may include modifying grazing strategies (e.g., adjusting the duration, intensity, and/or location of grazing) in order to facilitate recovery of riparian vegetation and associated channel forming processes. Passive restoration may also include riparian fencing and securing conservation easements to protect currently undeveloped riparian habitats and allow natural riparian processes to persist or recover as appropriate. Active restoration of riparian processes may include riparian vegetation planting; constructing bank stabilization structures where natural revegetation is not feasible; construction of riparian fences; and removal or relocation of roads, dikes, or other structures that currently impair stream and riparian function.

In addition to improving sediment and temperature conditions, restored riparian areas (including stable banks) would lead to reduced channel widths and corresponding increases in water depth and improved habitat complexity. These improvements are likely to increase productivity within the East Fork Salmon River steelhead population and contribute to increased abundance over time.

4. Increase habitat complexity and bank stability. Another additional priority action is the artificial placement of instream habitat structures. This approach is a last resort for stream reaches where the natural improvement of riparian and hydrologic processes is not feasible due to land use constraints. Where mechanical treatments are pursued, these projects should focus on improving streambank stability, increasing pool habitat and complexity, and providing for efficient sediment routing through the system. The East Fork Salmon River between Herd Creek and Little Boulder Campground is especially deficient in pool habitat and large woody

debris. Increasing pools and mechanically adding stable LWD to this reach could improve the East Fork population's productivity. However, careful evaluation of proposed projects is necessary to assure that watershed processes causing lack of pools or unstable banks are treated first, where feasible.

This population is estimated to be meeting its desired status, so no recovery plan actions directed specifically at this population are necessary at this time. However, habitat actions identified for the East Fork Salmon spring/summer Chinook population and the Lower Mainstem Salmon spring/summer Chinook population should also benefit the East Fork steelhead population and are listed in Table 5.3-52.

Implementation of Habitat Actions

Implementation of this recovery plan will likely occur through the work of the Custer County Soil and Water Conservation District and the Upper Salmon Basin Watershed Project. Between these two groups there is an excellent representation of private, state, and federal entities that manage land and other resources within the watershed. These entities have created an effective process for working together, providing technical reviews of proposed projects and working with interested parties to accomplish conservation on the ground. The entities include the IDWR, irrigation districts, IDFG, USFS, BLM, NMFS, The Nature Conservancy, private landowners, and many other groups necessary to accomplish habitat restoration goals.

These groups have a strong record of implementing water quality and salmon conservation projects in the past and have made very important contributions to salmon recovery projects. Recent actions in the East Fork drainage include installing a fish screen on the EF-14 diversion, modifying the EF-13 diversion to allow access to 1 mile of additional habitat, improvements to 500 feet of streambank on Herd Creek, and the installation of 9 measuring devices on water diversions. In Morgan and Challis Creeks, since 2001 several conservation measures have been taken within each watershed to benefit fish. These include replacement of the Challis Creek 8/8A diversion with an inflatable Obermeyer weir with an Alaska steep-pass fish ladder and the installation of fish screens on the lower irrigation diversions in each watershed (IDFG 2007 *draft*).

Habitat Cost Estimate for Recovery

This population is estimated to be meeting its desired status, so no recovery plan actions directed specifically at this population are necessary at this time. However, habitat actions identified for the East Fork Salmon spring/summer Chinook population and the Lower Mainstem Salmon spring/summer Chinook population should also benefit the East Fork steelhead population and are listed in Table 5.3-52. The total cost of habitat improvement projects in the East Fork Salmon population within the first 10 years is estimated at approximately \$517,000. These costs have been accounted for in the recovery plan subsections on Chinook salmon. The habitat cost estimate for East Fork Salmon steelhead is therefore zero.

Hatchery Recovery Strategy and Actions

[to be added]

Harvest Recovery Strategy and Actions

[to be added]

Table 5.3-52. Recovery Actions Identified for the East Fork Salmon River Steelhead Population.

Recovery Actions Identified for the East Fork Salmon River Steelhead Population.						
Natal Habitat Recovery Actions [Actions identified for spring/summer Chinook but will also benefit steelhead.]						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020
East Fork Salmon River and its tributaries	Altered riparian conditions and degraded water quality	(1) Passive restoration of riparian conditions through improvement of existing grazing practices and the transportation system (2) Active restoration projects including vegetation planting and bank stabilization.	500 feet of bank restoration using bank barbs	Costs associated with protecting private property	Uncertain at this time	
	Low flows caused by water diversions	Restore flow with water purchases or by enforcement of water right conditions	Gain 3.0 cfs by installation of water measurement devices and elimination of diversions	\$48,000	Uncertain at this time	
	Entrainment in ditches	Screening	3 fish screens installed.	\$195,000	Uncertain at this time	
	Barriers	Remove barriers	Removal of 1 barrier caused by irrigation structure	\$24,000	Uncertain at this time	
Challis Creek	Fish Passage	Remove barriers	2 barrier elimination projects (opening more than 2 miles of habitat)	\$100,000		
	Sediment	Improve bank stability and reduce road erosion	TMDL sediment reduction (320 lbs of sediment)	Clean Water Act Cost		
	Stream Flow	Restore flow with water purchases or by enforcement of water right conditions	1.5 cfs enhancement (1 project)	\$150,000		
Hatchery Recovery Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020
Harvest Recovery Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020

5.3.6.12 Upper Mainstem Salmon River Steelhead Population

Abstract/Overview

The Upper Mainstem Salmon River population is tentatively rated as maintained with moderate risk because the surrogate population for A-run steelhead passing Lower Granite Dam is at moderate risk, based on recent abundance and productivity. Diversity risk is also moderate. The population is targeted to achieve the desired status of Maintained, which requires no more than moderate abundance/productivity risk and moderate spatial structure/diversity risk.

Current Status	Desired Status
Maintained	Maintained

The desired status for the Upper Mainstem Salmon River population suggests that no recovery plan actions directed specifically at this population are necessary. However, a conservative management approach should be pursued until population-specific data become available to more accurately describe the status of this population. Recovery actions in the Snake and Columbia Rivers migration corridor, and spawning and rearing habitat actions aimed primarily at spring/summer Chinook, will further reduce the risk for this population.

While current best available information indicates that this population has achieved its desired status, there is a high degree of uncertainty in estimating the population's current status, as well as the nature and timing of the population's response to various recovery strategies. Due to this uncertainty, it is important to use an adaptive management strategy, in conjunction with the ESA's five-year status reviews and the information in the Research, Monitoring, and Evaluation chapter. If new information shows that this population has not achieved its desired status, it is imperative to identify those actions that are most likely to yield additional improvement.

Introduction

This section of the recovery plan compares the population's desired status to its current status, and describes how the population fits into the recovery strategy for the MPG and DPS. The primary sources of information are the ICTRT viability criteria (NMFS 2007b) and the ICTRT's Snake River steelhead status assessment (ICTRT 2008).

Population Status

The Population Status section describes the population's current status as defined in the ICTRT's most recent status assessment (ICTRT 2008) where they discussed risk in terms of four viability parameters: Abundance, Productivity, Spatial Structure and Diversity. Other available information was also considered. The section focuses primarily on population Abundance (the total number of adults) and Productivity (the ratio of returning adults to the parental spawning adults). It compares the population's current status to the desired status in terms of both abundance and productivity. It also summarizes Spatial Structure (the amount and nature of available habitat) and Diversity (genetic traits) concerns identified by the ICTRT. Diversity concerns are also discussed in the hatchery section. More details are available in the Snake River steelhead status assessment (ICTRT 2008).

Population Description: The Upper Mainstem Salmon steelhead population includes the Salmon River and its tributaries upstream from the confluence from the East Fork Salmon River. The ICTRT (2003) distinguished the Upper Mainstem Salmon steelhead population as a single independent population

based largely on distance from other spawning aggregates. This population is separated from all other steelhead spawning aggregates by a minimum of 75 km.

The current steelhead distribution in the Upper Mainstem Salmon includes the watersheds of Valley Creek, Warm Spring Creek, Slate Creek, Thompson Creek, Yankee Fork, and the upper Salmon River and tributaries. A NMFS model of potential habitat for the Interior Columbia Basin, based on geomorphological characteristics, suggests that the historic distribution of steelhead could have included additional tributaries and could have been more expansive in some streams than current distribution (NMFS 2006) (see Figure 5.3-53).

The Upper Mainstem Salmon River steelhead population is an A-run population. A steelhead hatchery program for harvest augmentation is operated out of the Sawtooth Fish Hatchery, five miles south of Stanley, and the facility includes a permanent weir across the Salmon River. The hatchery program was founded from both local and out-of-MPG stocks.

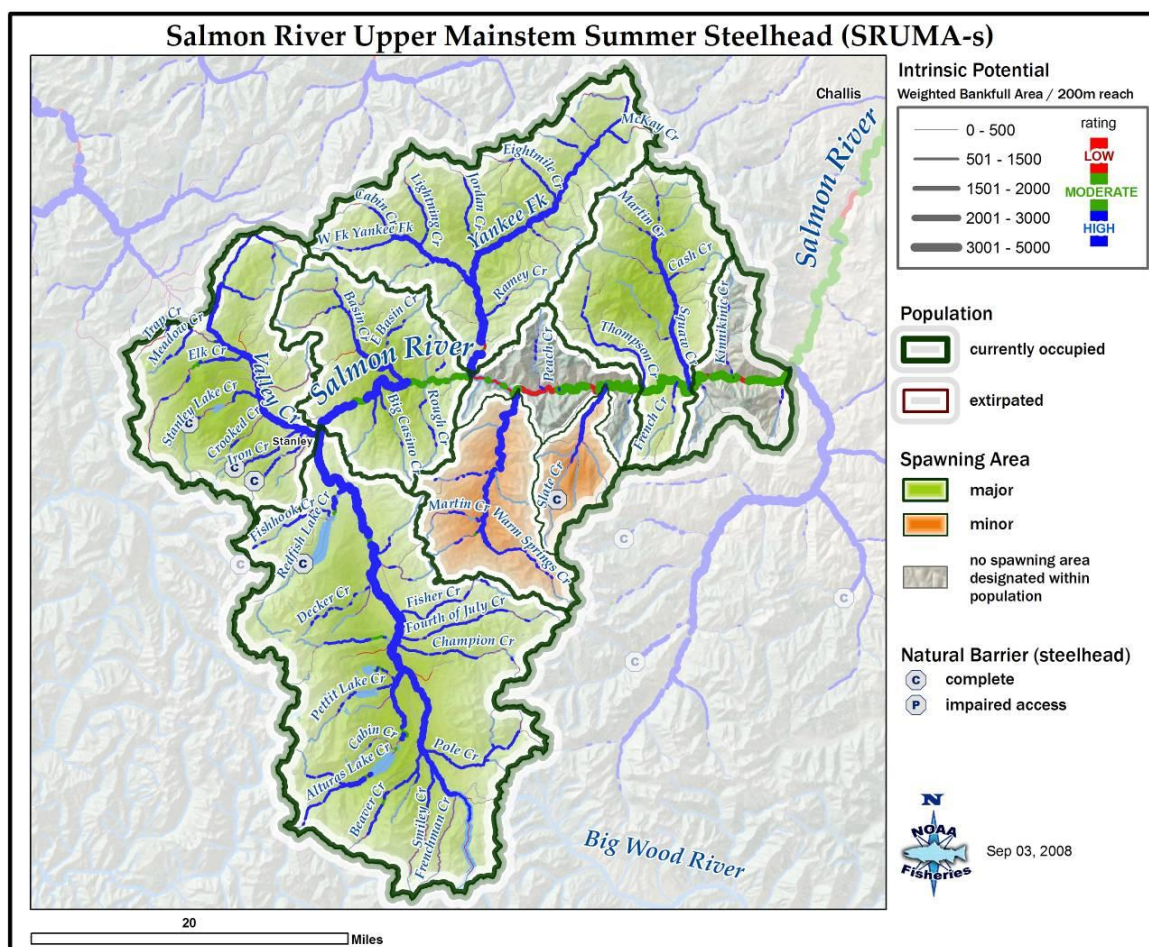


Figure 5.3-53. Upper Mainstem Salmon River steelhead population, with major and minor spawning areas.

The ICTRT classified the Upper Mainstem Salmon River population as “intermediate” in size and complexity based on historical habitat potential (ICTRT 2007). A steelhead population classified as

intermediate has a mean minimum abundance threshold of 1,000 natural-origin spawners with sufficient intrinsic productivity (≥ 1.14 recruits per spawner at the minimum abundance threshold) to achieve a 5 percent or less risk (“low risk”) of extinction over a 100-year timeframe. For the Upper Mainstem Salmon River population to achieve a 25 percent or less risk (“moderate risk”) of extinction over 100 years, abundance and productivity targets are somewhat lower.

Abundance and Productivity: Population-specific abundance estimates are not available for most Snake River steelhead populations, including the Upper Mainstem Salmon population. Instead, the ICTRT generated preliminary estimates of average population abundance and productivity using annual counts of wild steelhead passing Lower Granite Dam. Estimates were developed for two average surrogate populations to represent both major run types (A and B). These abundance and productivity estimates were then compared to a viability curve for an intermediate-sized Snake River steelhead population (requiring a minimum abundance threshold of 1,000 natural-origin spawners and a productivity of 1.14 recruits per spawner).

The surrogate population for A-run steelhead above Lower Granite Dam has an estimated recent abundance of 556 and productivity of 1.86. It is rated as moderate risk based on current abundance and productivity, as shown in Figure 5.3-54 (25% or less risk of extinction over a 100-year timeframe). Although the current estimate of intrinsic productivity is above the minimum threshold for low risk, the current average natural abundance (recent 10-year geometric mean) is well below the ICTRT minimum threshold value of 1,000. More specific information about how the abundance and productivity estimates were calculated is included in the ICTRT’s steelhead status assessment, Appendix B-1 *Calculating Representative Abundance and Productivity Estimates for Snake River A and B-run Steelhead Populations*.

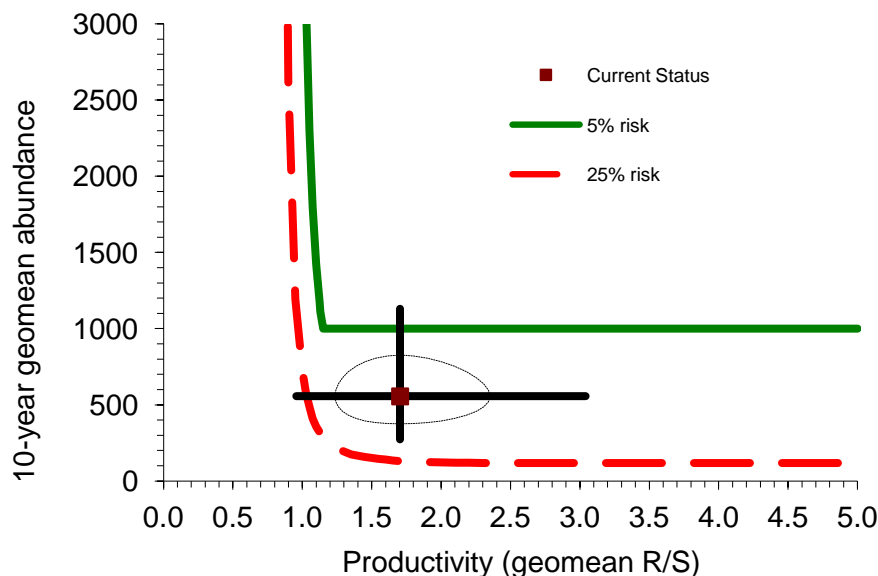


Figure 5.3-54. Snake River A-run surrogate steelhead population current estimated abundance and productivity (A/P) compared to DPS viability curve (1986-2005). Ellipse = 1 SE about the point estimate. Error bars = 90% CI for A, 98% CI for P (if point estimate >1% risk curve, the uncertainty test is <1% probability the combined A/P is at high risk).

Based on the surrogate A-run population, the ICTRT gave this population a tentative abundance/productivity rating of moderate risk.

Spatial Structure: The ICTRT has identified five major spawning areas and two minor spawning areas within this population. Based on spawner surveys and juvenile distribution data, spawning is assumed to be occurring throughout the population, in the upper mainstem Salmon River and in many tributaries, mirroring historic distribution. This population therefore has a very low spatial structure risk, which is sufficiently low for the population to attain its overall desired status.

Diversity: No genetic data were available for the Upper Mainstem Salmon River steelhead population. The major life history strategies historically represented in the population are unknown. The population is currently classified as consisting only of A-run steelhead, but there is some speculation that B-run steelhead also may have historically been part of the population.

Hatchery steelhead are released into this population at multiple locations for both harvest augmentation and for supplementation of the natural population. The harvest augmentation hatchery program releases marked smolts derived from both local and out-of-MPG stocks. Some returning hatchery fish are not harvested in fisheries and do not recruit back to weirs or traps, and are thus assumed to be spawning naturally in the population. The number and proportion of natural spawners that are hatchery-origin is unknown. The prevalence of hatchery-origin spawners is assumed to be highest in the mainstem Salmon River between the Yankee Fork Salmon River and the Sawtooth Fish Hatchery weir. These hatchery spawners pose a genetic risk to the natural population.

An additional diversity concern for this population is the current management practice of releasing unmarked hatchery steelhead and planting eyed eggs to supplement natural production. Planned production releases for brood years 2008 - 2017 under the current U.S. v. Oregon TAC Interim Management Agreement for upriver Chinook, sockeye and steelhead fisheries include releases into the Yankee Fork and may include other tributaries if hatchery production is adequate.

The presence of hatchery fish in this population leads to a moderate cumulative diversity risk, which is adequate for the population to reach its desired status.

Summary: The Upper Mainstem Salmon River steelhead population is currently rated at moderate risk due to a tentative moderate risk rating for abundance/productivity and a moderate risk rating for diversity. A population-specific monitoring program is necessary to reduce the uncertainty of this rating. Table Figure 5.3-53 shows the population's current and desired status (both maintained) in terms of cumulative abundance/productivity and spatial structure/diversity risks. A complete version of the ICTRT's draft status assessment for Snake River Basin steelhead populations is available upon request from NMFS.

Table 5.3-53. Upper Mainstem Salmon River population risk ratings integrated across the four viable salmonid population (VSP) metrics.

		Spatial Structure/Diversity Risk			
		Very Low	Low	Moderate	High
Abundance/ Productivity Risk	Very Low ($<1\%$)	HV	HV	V	M
	Low (1-5%)	V	V	V	M
	Moderate (6 – 25%)	M	M	M Upper Mainstem Salmon River	HR
	High ($>25\%$)	HR	HR	HR	HR

Viability Key: HV – Highly Viable, V – Viable, M – Maintained, and HR – High Risk; shaded cells – do not meet viability criteria, with darkest cells signifying the highest risk of extinction. Percentages refer to risk of extinction over 100 years. Arrow points to desired risk status.

This population may be currently meeting its desired status of maintained with moderate risk, so no recovery plan actions directed specifically at this population are necessary at this time. However, the following sections on limiting factors and recovery strategies are included for several reasons. Considerable uncertainty is involved in achieving the desired status for all of the populations within the Salmon River MPG, so further reducing the risk status for the Upper Mainstem Salmon River population could provide flexibility for meeting the delisting goal for the MPG. Due to lack of population-specific abundance and productivity data, there is also uncertainty associated with the conclusion that the Upper Mainstem Salmon River population is currently meeting its desired status. Finally, further reducing the extinction risk for this population could be necessary for meeting goals beyond compliance with the Endangered Species Act, such as additional harvest by the state of Idaho or interested tribes.

Limiting Factors and Threats Specific to Population

This section describes the limiting factors and threats that are specific for the population. The population is also affected by limiting factors and threats in the mainstem Columbia/Snake River corridor, estuary, and plume, and by climate change. Section 5.1.1 summarizes regional-level factors that affect all Idaho Snake River steelhead populations.

Natal Habitat

Habitat Conditions: The Upper Mainstem Salmon steelhead population includes the Salmon River and its tributaries upstream from the confluence of the East Fork Salmon River. The Upper Mainstem Salmon steelhead population geographic boundary drains approximately 1,150 square miles. Climate in the Upper Salmon basin is characterized by cold winters and warm dry summers. Elevation, climate, and aspect of the area cause climate conditions to be variable throughout the subbasin. The average annual precipitation measured in Stanley, Idaho is about 14.54 inches with an average snowfall of about 72.4 inches. Approximately 70 percent of the precipitation falls within the spring and fall

seasons (IDEQ 2003). Late spring and summer high-intensity thunderstorms may accumulate an inch of precipitation in less than a 24-hour period.

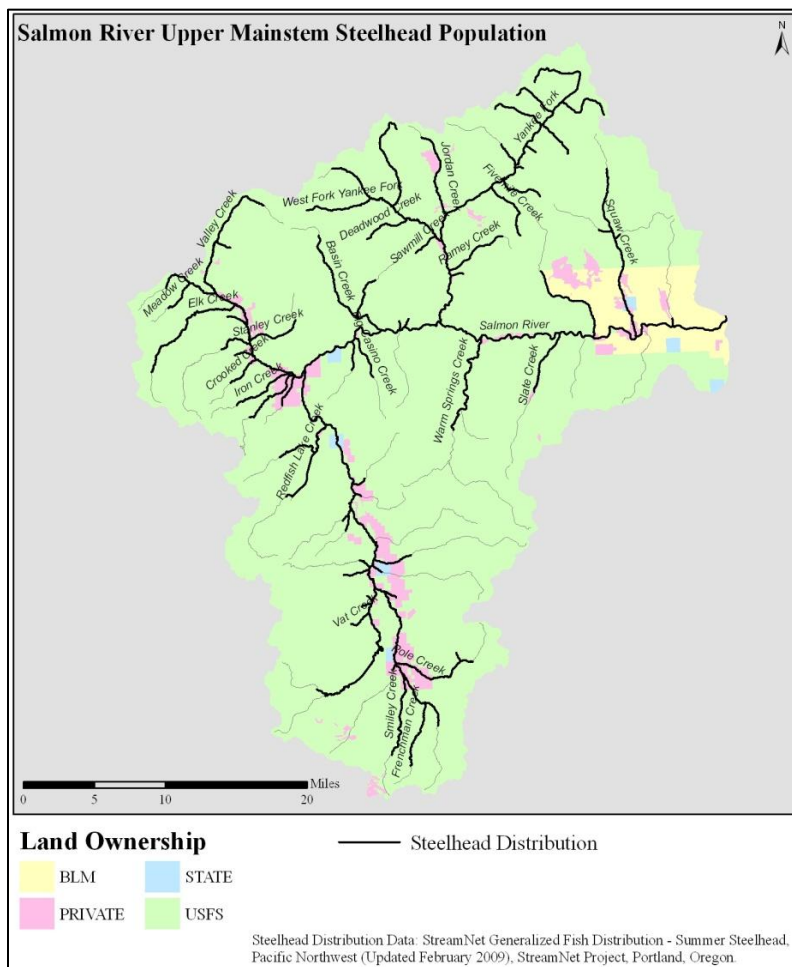


Figure 5.3-55. Land ownership in the Upper Mainstem Salmon River steelhead population.

The Upper Salmon subbasin is primarily composed of steep, narrow drainages with V-shaped valleys. The floodplain of the Upper Salmon River, in the Stanley Basin, is fairly broad compared to the floodplain in the canyon reach of the Salmon River further downstream.

Land ownership within this population is mostly federal, with the USFS at 91.4 percent and BLM at 4.1 percent. The remainder of the land is in private (4.0%) and state (0.5%) ownership. Private land is generally concentrated in the valley bottoms, near the towns of Stanley and Clayton and along the upper Salmon River (Figure 5.3-55). BLM lands are concentrated around the town of Clayton and state of Idaho ownership is a few township sections scattered throughout. Many upper stream reaches in this population occur in inventoried roadless areas of federal land, including the Sawtooth Wilderness and the proposed Boulder White-Clouds and Hanson Lakes wilderness areas. The Sawtooth National Recreation Area encompasses much of the population.

Land use in the Upper Mainstem Salmon River has included mining, forestry, livestock grazing, recreation and some residential development. With such diverse land uses the degree of habitat alteration in the Upper Mainstem Salmon has varied. Impacts to habitat have ranged from extensive historic dredge mining operations in the lower Yankee Fork, which substantially altered the river channel, riparian conditions, and floodplain, to small livestock grazing operations, which altered local patches of streambank and riparian conditions. Mineral exploration and mining were prevalent in the past but mining activity declined at the beginning of the 20th century. Livestock grazing is common in many of the subwatersheds in this population, and has led to sedimentation, bank instability, and loss of riparian vegetation. Roads and riparian conversion to fields or residential development have caused channel alterations. Finally, irrigated pastures and hay fields are common along valley bottoms, relying on numerous water withdrawals from streams. Despite current and past land use effects, the quantity of good-to-excellent habitat for steelhead is still fairly abundant in the Upper Mainstem Salmon (NPCC, p. 1-36). Current steelhead spawning and rearing occurs throughout much of the Upper

Mainstem Salmon including Valley Creek, Basin Creek, Thompson Creek, Slate Creek, Yankee Fork, and the upper Salmon River and its tributaries (Figure 5.3-55).

IDEQ's Integrated (303(d)/305(b)) Report identifies stream segments in this population that are not fully supporting their assessed beneficial uses under the Clean Water Act. Table 5.3-54 shows the impaired stream segments listed in IDEQ's report under section 5 (impaired waters that need a TMDL), section 4c (waters impaired by non-pollutants), and section 4a (impaired waters that have an EPA-approved TMDL) (IDEQ 2009).

Table 5.3-54. Stream segments in the Upper Mainstem Salmon steelhead population identified from sections 4a, 4c, and 5 of the IDEQ 2008 303(d)/305(b) integrated report (IDEQ 2009).

Waterbody	Impairment/Cause	Stream Miles
Section 5-303(d)-Impaired Waters Needing a TMDL		
Squaw Creek - Cash Creek to mouth	Water temperature	7.79
Squaw Creek - confluence of Aspen and Cinnabar Creeks to Cash Creek	Water temperature	0.49
Aspen Creek - source to mouth	Water temperature	60.16
Bruno Creek - source to mouth	Combined Biota/Habitat Bioassessments*	8.78
Salmon River - Thompson Creek to Squaw Creek	Sedimentation/Siltation; Water temperature	4.4
Yankee Fork Creek - source to Jordan Creek	Sedimentation/Siltation	7.05
Salmon River - Valley Creek to Yankee Fork Creek	Sedimentation/Siltation; Water temperature	12.64
Basin Creek - East Basin Creek to mouth	Sedimentation/Siltation	2.36
Valley Creek - Trap Creek to mouth	Combined Biota/Habitat Bioassessments	30.01
Meadow Creek - source to mouth	Combined Biota/Habitat Bioassessments	4.4
Salmon River - Redfish Lake Creek to Valley Creek	Sedimentation/Siltation; Water temperature	5.39
Salmon River - Fisher Creek to Decker Creek	Sedimentation/Siltation	8.39
Slate Creek - source to mouth	Combined Biota/Habitat Bioassessments	37.05
Section 4c-Waters Impaired by Non-pollutants		
Yankee Fork Creek - source to Jordan Creek	Physical substrate habitat alterations	7.05
Basin Creek - East Basin Creek to mouth	Physical substrate habitat alterations	2.36

*The combined biota/habitat bioassessment cause is assigned to a waterbody on the 303(d) list (Category 5 of the integrated report) when bioassessment scores indicate poor habitat and/or aquatic community conditions and there is insufficient information to determine the cause(s) of the poor bioassessment scores.

Current Habitat Limiting Factors: NMFS determined the habitat limiting factors by reviewing multiple data sources and reports on stream conditions. Based on reports and discussions with local fisheries experts and watershed groups, NMFS concluded that the habitat limiting factors for the Upper Mainstem Salmon steelhead population are reduced streamflow and passage barriers, restoration of degraded habitat and juvenile fish entrainment. Table 5.3-55 summarizes the mechanisms by which each limiting factor affects steelhead, and the management objectives for addressing each limiting factor. The following section discusses each of the limiting factors using information from IDEQ, the

Salmon Subbasin Assessment and Management Plan, and the Idaho Model Watershed Plan (IDEQ 2001, IDEQ 2009, ISSC 1995, NPCC 2004, Ecovista 2004).

Table 5.3-55. Primary limiting factors identified for the East Fork Salmon steelhead population, mechanisms by which each limiting factor affects salmonids, and management objectives for addressing each limiting factor.

Limiting Factors	Effects on Salmonids	Management Objectives to Address Limiting Factors
Stream Flow	Low stream flows reduce available habitat, can exacerbate high stream temperature conditions, and in extreme conditions can create barriers to migrations or movement (dry stream channels).	Restore natural hydrograph to provide sufficient flow during critical periods.
Migration Barriers	Migration barriers such as dams, culverts, and dewatered stream sections can create fish passage barriers. These barriers reduce or eliminate movement of adult and juvenile salmon within a watershed ultimately reducing potential spawning and rearing habitat.	Restore passage and connectivity to habitats blocked or impaired by artificial barriers and maintain properly functioning passage and connectivity.
Entrainment	Juvenile fish entrainment occurs through unscreened irrigation diversions. Young salmon are at risk when they are diverted into canals or diversion ditches.	Restore passage and connectivity to habitats blocked or impaired by artificial barriers and maintain properly functioning passage and connectivity.
Sediment	Excess sediments can reduce juvenile habitat (rearing), aquatic insect availability (food), and spawning and incubation success (reproduction).	Improve degraded water quality and maintain unimpaired water quality

1. Low Flow during Critical Periods.

The NPCC's subbasin plan identified reduced streamflow in the Salmon River mainstem from the confluence of the East Fork to the headwaters as having a high influence on habitat quality (NPCC 2004, p. 3-14). Numerous irrigation withdrawals for pastures alter the natural hydrologic regime in the Upper Mainstem Salmon River. Water diversions may affect fish by reducing instream flow and thereby reducing habitat availability, by blocking fish passage to upstream or downstream habitat, or by entraining fish in irrigation ditches if the diversion structures do not have adequate screens in place. Conditions reported for the Upper Salmon Mainstem suggest that reduced stream flow is limiting population abundance and productivity.

Valley Creek. Irrigation diversions are affecting salmonid habitat throughout the watershed, as reported by the SNF (2010). In upper Valley Creek there are diversions on several tributaries and on the Valley Creek mainstem. In many of the smaller tributaries, such as McGown Creek, Thompson Creek, and Park Creek, historic channels have been abandoned as all the flow is incorporated into the irrigation systems. Diversions on these tributaries reduce baseflows in upper Valley Creek during the irrigation season from June through September. Within Elk Creek two surface water diversions have substantially reduced baseflows near the mouth during some years, as well as created an upstream migration barrier. The uppermost diversion was removed and the ditch plugged in 2009 but the lower diversion remains. A small diversion takes water from lower Stanley Lake Creek, but this diversion is estimated to remove less than 10 percent of streamflow from June through September.

Upper Valley Creek itself has several large diversions. In 1999, two diversions on upper Valley Creek (VC5 and VC6) were consolidated at a new point of diversion that improved long-standing passage concerns (SNF 2010). Nonetheless, these diversions reduce instream flow, thereby reducing and degrading salmonid habitat in Valley Creek. In lower Valley Creek, irrigation diversions exist on most

major tributaries. These diversions create numerous seasonal barriers to fish migration. The diversions reduce instream flows substantially such that base flows are insufficient to maintain habitat or passage for salmonids during most years in Meadow Creek, Goat Creek, and Iron Creek. Two irrigation diversions formerly diverting water from Crooked Creek were removed from USFS land in 1999 and the ditchlines rehabilitated. Not all existing tributary diversions are adequately screened.

Upper Salmon River above Stanley. Water diversions exist on most tributaries to the Upper Salmon River in the Stanley basin, reducing streamflows and creating passage barriers. Diversions on Smiley, Champion, Fourth of July, Fisher, Gold, Williams, Cleveland, and Boundary Creeks result in very low baseflows and likely create seasonal barriers to fish passage. In addition, irrigation diversions on Fisher Creek dewater the last mile of stream during the summer irrigation season in most years (SNF 2009c).

2. Migration Barriers and Fish Entrainment.

Passage barriers in the population area are primarily caused by irrigation diversions and road culverts. Migration barriers and fish entrainment from irrigation diversions were identified as limiting factors in the Upper Mainstem Salmon steelhead population by the Salmon River Subbasin Assessment (NPCC 2004). Fish passage was identified as having a moderate influence on Valley Creek and upper mainstem Salmon River habitat conditions (NPCC 2004, p. 3-13, 3-14). As noted in the previous section, dewatered stream sections caused by irrigation withdrawals reduce potential rearing habitat and potential thermal refuge offered in colder tributary streams.

Information on how the diversions impact fish passage is incomplete at this time, although the Sawtooth National Forest has begun a process to identify passage barriers at irrigation diversions across the upper Salmon River basin and Valley Creek. Table 5.3-52 displays results from the Sawtooth National Forest survey of many of the diversion structures. This survey did not include as many as 31 additional diversions on private property along the mainstem Salmon River and on Smiley, Beaver, Champion, Fisher, Williams, and Cleveland Creeks or seven additional diversions on federal land on Cabin, Vat, Hell Roaring, Cleveland, and Niece Creeks (SNF 2009c). Considering the information presented in Table 5.3-56, there are very few diversion structures where fish distribution ends, based on current knowledge. In most situations adults or juveniles have been found above each diversion implying at least seasonal passage. However, in Pole Creek, the distribution of Chinook and steelhead ends at the diversion (PC7). Diversions on Smiley, Champion, Fourth of July, Fisher, Gold, Williams, Cleveland, and Boundary Creeks result in very low baseflows and likely create seasonal barriers to fish passage. In addition, irrigation diversions on Fisher Creek dewater the last mile of stream during the summer irrigation season in most years (SNF 2009a).

Barriers exist on most major tributaries in lower Valley Creek, including the tributaries of Meadow (lower), Goat, Iron, Crooked, Job, and Stanley Creeks. Numerous seasonal barriers (private irrigation diversions) exist on nearly every tributary within this portion of the watershed, located on both public and private land. Instream base flows are insufficient to maintain habitat and passage for salmonids in Meadow, Goat, and Iron Creeks in most years.

Table 5.3-56. Fish passage at diversion structures within the Upper Salmon River Mainstem (SNF 2009a).

A. Valley Creek

Stream	# Diversions/ # w/ Barrier Evaluation	Adult Passage at Low Flow	Adult Passage at Mod. Flow	Adult Passage at High Flow	Juvenile Passage at Low Flow	Juvenile Passage at Mod. Flow	Juvenile Passage at High Flow
Meadow Creek (lower) ^b	5/0						
Goat Creek ^{a, b}	14/2	1-B, 1-P	2-F	2-F	1-B, 1-P	1-P, 1-F	2-F
Iron Creek ^b	9/5	2-B, 2-P, 1-F	1-P, 4-G	1-P, 4-G	2-B, 2-F, 1-P	2-B, 2-G, 1-F	3-G, 2-F
Job Creek	1/0						
Tennell Creek ^b	2/0						
Valley Creek (lower mainstem) ^b	3/2	1-P, 1-VG	1-P, 1-VG	1-G, 1-VG	1-F, 1-VG	1-G, 1-VG	1-G, 1-VG
Stanley Lake Creek	1/1	VG	VG	VG	VG	VG	VG
Elk Creek	2/2	2-P	2-F	1-F, 1-G	1-B, 1-F	1-B, 1-P	1-B, 1-G
McGown Creek ^b	2/0						
Park Creek	1/0						
Valley Creek (upper mainstem)	1/1	G	VG	VG	G	VG	VG
Totals:	41	13					

B. Salmon River and Tributaries above Valley Creek

Stream	# Diversions/ # w/ Barrier Evaluation	Adult Passage at Low Flow	Adult Passage at Mod. Flow	Adult Passage at High Flow	Juvenile Passage at Low Flow	Juvenile Passage at Mod. Flow	Juvenile Passage at High Flow
Salmon River (Pole Creek upstream) ^{a/b}	5/1	VG	VG	VG	VG	VG	VG
Smiley Creek ^{a/b}	2/0						
Beaver Creek ^{a/b}	4/2	1-G, 1-B	1-F, 1-B	1-B, 1-P	2-G	2-F	1-B, 1-F
Pole Creek	1/1	P	P	P	G	F	F
Cabin Creek	1/0						
Vat Creek	1/0						
Warm Creek	1/1	VG	VG	VG	VG	VG	VG
Lost Creek ^b	2/0						
Salmon River (Alturas Lake Ck. to Pole Ck.) ^{a/b}	1/0	No Diversion Structure (Pump)					
Champion Creek ^b	5/3	1-VG, 2-B	1-G, 2-B	1-G, 2-B	1-VG, 1-P, 1-B	1-G, 1-P, 1-B	1-G, 2-B
Fourth July Creek ^b	3/3	2-G, 1-F	1-G, 2-F	1G, 2-B	1-VG, 2-G	1-VG, 1-G, 1-F	1-VG, 1-G, 1-B
Hell Roaring Creek	1/0						
Salmon River (Fourth July to Alturas Lake Ck.) ^{a/b}	1/1	1-VG	1-G	1-F	1-VG	1-G	1-F
Fisher Creek ^{a/b}	10/0						
Gold Creek	4/3	1-B, 1-G, 1-F	1-VG, 1-F, 1-G	1-VG, 1-B, 1-G	1-VG, 1-F, 1-G	1-VG, 2-F	1-B, 1-P, 1-F
Club Canyon Creek	2/0						
Williams Creek	3/2	1-F, 1-VG	1-G, 1-VG	1-F, 1-G	1-G, 1-VG	1-F, 1-G	1-P, 1-G

Stream	# Diversions/ # w/ Barrier Evaluation	Adult Passage at Low Flow	Adult Passage at Mod. Flow	Adult Passage at High Flow	Juvenile Passage at Low Flow	Juvenile Passage at Mod. Flow	Juvenile Passage at High Flow
Salmon River (Redfish Lake to Fourth July Ck.) ^{a/b}	5/3	2-VG, 1-B	1-VG, 1-B, 1-G	1-VG, 1-B, 1-G	2-VG, 1-B	2-VG, 1-B	2-VG, 1-B
Redfish Lake Ck. ^a	3/0	No Diversion Structure (Pump)					
Fishhook Creek	2/0	No Diversion Structure (Pump)					
Boundary Creek	1/1	P	B	B	B	B	B
Cleveland Creek	2/0						
Niece Creek	2/0						
Totals:	61/21						

Year-round or seasonal barriers also exist at many culvert road crossings. Culvert inventories conducted by the Sawtooth National Forest in 2003 and 2007 revealed that passage is impeded in many important tributaries within the subbasin at certain flow conditions (Table 5.3-57). Most barriers occur in tributary headwaters (i.e., Smiley Creek, Little Beaver Creek, Twin Creek, Vat Creek, etc.), affecting minor amounts of habitat. However, culverts on Fisher, Cabin, and Mays Creek block habitat to fish moving from the Salmon River and adjacent tributaries. Two culverts in Pole Creek, one in Fisher Creek, and one in Williams Creek are considered partial barriers to fish passage (SNF 2009a). Passage is impeded in many important tributaries within Valley Creek at certain flow conditions. Problem culverts on Iron and Goat Creek are scheduled for replacement in 2011.

Table 5.3-57. Miles of habitat blocked or partially blocked by culverts in the Upper Salmon River Mainstem (SNF 2009a).

Stream	Miles Completely Blocked	Miles Partially Blocked
Upper Salmon and Tributaries		
Frenchman & Headwaters Salmon River	0.32 ^a	-
Smiley Creek	1.43 ^b	1.77 ^a
Beaver Creek	1.94 ^c	-
Pole Creek	0.25 ^b (Twin Creek)	5.87 ^b (Pole Creek)
Cabin Creek	2.55 ^b	-
Vat Creek	0.78 ^a	-
Mays Creek	1.75 ^b	-
Fisher Creek	0.64	4.05 ^b
Williams Creek	-	2.63 ^b
Boundary Creek	1.36 ^a	-
Totals:	11.02	14.32
Valley Creek Drainage		
Meadow Creek (lower)	-	3.3
Goat Creek	-	6.5
Iron Creek	-	5.7
Job Creek	2.75	-
Stanley Creek	2.60	2.5
Stanley Lake Creek	3.39	-
Elk Creek	-	11.0
Trap Creek	-	5.5
Hanna Creek	1.66	-
Totals:	10.40	34.5
Key: a – Stream segment not delineated above culvert; b - Miles not taken to the end of the stream; c – Historic habitat for Chinook and steelhead not delineated in Little Beaver Creek.		

3. *Excess Sediment.*

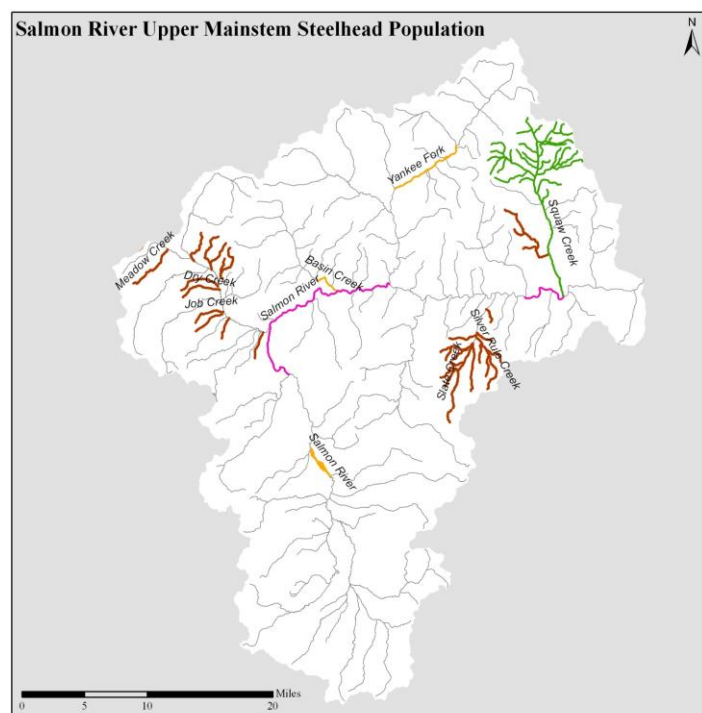
Conditions reported for the Upper Mainstem Salmon steelhead population suggest that sediment may be reducing the population's abundance and productivity. The Salmon Subbasin Assessment rated the influence of increased fine sediments on habitat quality as moderate in Yankee Fork and Valley Creek (NPCC 2003, p 3-13). In the Salmon River mainstem upstream from the East Fork, the influence of fine sediment on habitat quality was considered high (NPCC, p. 3-14). As indicated by IDEQ's integrated report, some stream reaches in the Salmon River, Yankee Fork, and Basin Creek are impaired by excess fine sediments (Figure 5.3-56). The Yankee Fork is presumed to be a major source of sediment to the Salmon River largely because of historic dredge mining on 13 miles of lower Yankee Fork (USFS 1999).

IDEQ (2003) reports a range of sediment conditions throughout this population. McNeil sediment core sampling in spawning habitat of the Yankee Fork has shown significant decreases at two sites over a 5-year period, no change at one site, and significant increases at two sites (IDEQ 2003, p. 67). In Basin Creek, fine sediment levels from a single monitoring station varied greatly from 13.5 to 33.3 percent, well above a NMFS standard of less than 12 percent fines in gravel for properly functioning sediment conditions (NMFS 1996). Sediment monitoring on the Upper Salmon River showed elevated subsurface fine sediment at one site below the confluence of Hell Roaring Creek (42% fine sediment) and at another site below the confluence of Redfish Lake Creek (51% fine sediment) (IDEQ 2003). The primary overall source of fine sediment for these reaches of the Salmon River is stream bank erosion associated with winter ice damming and natural stream channel migration across the low gradient

reach that extends across Decker Flat, from the confluence of Alturus Lake Creek downstream to the confluence of Williams Creek (IDEQ 2003). Historic land management in this area was predominantly livestock grazing. Improved grazing management, including riparian fencing, has now eliminated or greatly reduced the impacts to stream banks from grazing, but sediment levels remain elevated.

4. *Elevated Water Temperature.*

The Salmon Subbasin Assessment rated the influence of elevated water temperature on habitat quality as moderate in Yankee Fork and Valley Creek (NPCC 2003, p 3-13). In the Salmon River mainstem



303(d) List

— Sediment, Temperature — Temperature
— Sediment — Does not support beneficial use - cause unknown

Data: Idaho Department of Environmental Quality. Idaho 2008 305(b)/303(d) Integrated Report (Final).

Figure 5.3-56. Stream segments in the Upper Mainstem Salmon steelhead population identified from Sections 4c and 5 of the IDEQ 2009 303(d)/305(b) integrated report (IDEQ 2009).

upstream from the East Fork, the influence of water temperature on habitat quality rated high (NPCC, p. 3-14).

Water temperature has been identified as impaired on the 303(d) list for the Squaw Creek watershed and for three sections of the Salmon River between Redfish Lake Creek and Squaw Creek (Figure 5.3-56). In these streams or stream segments cold water aquatic life standards were exceeded. The temperature criteria (values not to be exceeded) for cold water use are 22°C as a daily maximum and 19°C as a daily average. In Squaw Creek, the primary land use activities are mining, followed by livestock grazing, irrigated pasture and recreation. IDEQ (2003) noted that there is some potential that the lower portion of Squaw Creek is influenced by geothermal activity. Elevated stream temperature in the Squaw Creek subwatershed may be from the combined effect of flow alteration and geothermal inflow. Squaw Creek was not recommended for a TMDL because of the natural geothermal influence. No temperature TMDL has been recommended for segments of the Salmon River because information suggests that beneficial uses are fully supported (IDEQ 2003, p. 62).

5. Loss of floodplain connectivity and riparian function.

Ecovista (2004, p. 58) suggests that modifying stream flow withdrawals to increase instream flows alone will not restore adequate base flows. Restoration of adequate summer base flows will also require the restoration of water storage mechanisms (e.g. wetlands, functional riparian areas, side channels, groundwater recharge, etc.). This will require improvements in riparian and wetland function as well as floodplain connectivity. Channel confinement and development of riparian areas all along the Salmon River has caused a reduction in the pool-to-riffle ratio, a reduction in streambank stability, a reduction in shade, and has limited salmonid access to side channel habitat.

Potential Habitat Limiting Factors and Threats: Several potential concerns have not yet risen to the level of a limiting factor or threat, but should be managed to protect steelhead habitat in the Upper Mainstem Salmon River population area and allow any degraded habitat to recover.

1. Habitat degradation from dispersed recreation. Recreation can damage vegetation, compact soils, channelize overland water flow, and increase erosion. Monitoring sites where recreation use is concentrated, and modifying or discontinuing use of these sites if riparian habitat deteriorates, will likely minimize impacts.
2. Habitat degradation from off-highway vehicle use. Assuring that OHV use is restricted to existing USFS roads and trails will likely minimize impacts.
3. Reduced water quality due to new mineral exploration and development. Without sufficient water quality conservation measures, new mining operations could release sediment and toxic chemicals into surface waters.
4. Reduced water quality due to heavy metals. Risk of heavy metal contamination of ground and surface waters from legacy mining waste.
5. Habitat degradation from noxious weeds. The spread of noxious weeds can increase soil erosion and decrease native plant density.

Hatchery Programs

[To be developed]

Harvest Management

[To be developed]

Recovery Strategies and Actions

The recovery strategies that address a limiting factor may include both short-term and long-term actions. Short-term actions are projects scheduled to be implemented within the next ten years by a resource management agency or local stakeholder group. Long-term actions are categories of actions that could increase productivity for the population, but for which a specific project has not yet been proposed by a resource management agency or other stakeholder.

Natal Habitat Recovery Strategy and Actions

Priority stream reaches: The Upper Salmon Basin Watershed Project (USBWP) implementation group created a list of priority stream segments for salmonid habitat improvement projects (USBWP 2005). This prioritization report, Screening and Habitat Improvement Prioritization for the Upper Salmon Subbasin (SHIPUSS), considered multiple species, including spring/summer Chinook, steelhead, and bull trout. Despite including other species, the SHIPUSS prioritization overlaps considerably with habitat that has intrinsic potential for steelhead and is therefore transferable to this recovery plan. The SHIPUSS priority stream reaches are shown in Figure 5.3-57. Under SHIPUSS, Priority I streams are those streams that have the potential to realize immediate, tangible benefits to fish if recovery efforts are directed toward them. Priority II streams are those streams that will also see tangible benefits to fish as a consequence of recovery projects, but where the benefits may be less substantial or may be delayed for quite some time (USBWP 2005).

Habitat actions: The following habitat actions, ranked by priority, are intended to improve abundance and productivity for the Upper

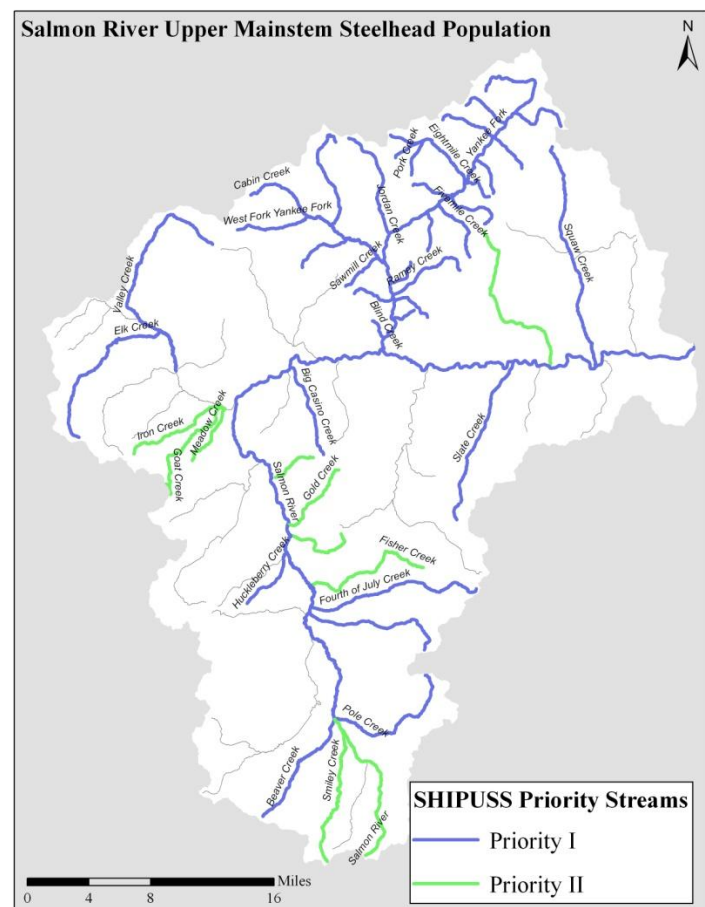


Figure 5.3-57. Priority streams for the Upper Mainstem Salmon River Steelhead Population.

Salmon Mainstem steelhead population. Because this population covers a diverse landscape, habitat actions are listed separately for the upper Salmon River, Valley Creek, and Yankee Fork Salmon River.

Upper Salmon River above Valley Creek

1. Increase streamflow and provide screening and passage. For all surface water diversions, assure that diversions bypass adequate flows, provide for fish passage, and have adequate screening in place, particularly in eastern tributaries of the Salmon River. Improve stream flows in the mainstem Salmon River and improve stream flow and connectivity of tributaries that are currently disconnected from the mainstem Salmon River due to water diversions.
2. Reduce sediment delivery to streams. Reduce road-related sediment delivery within southern and eastern drainages of the population, including Fisher Creek, upper Salmon River, Fourth of July Creek, Pole Creek, Frenchmen Creek, Smiley Creek, and Beaver Creek; Fisher Creek and the upper Salmon River headwaters are the priorities. Also reduce sediment delivery associated with livestock grazing, dispersed recreation, and irrigation use.
3. Restore degraded riparian and floodplain habitat through the following actions:
 - a. Reduce grazing impacts to streams and riparian habitat. Control livestock access to encourage establishment of mature riparian vegetation.
 - b. Plant or provide for regrowth of natural riparian woody and hydric vegetation composition, age classes, structure, and pattern in order to restore and maintain streambank stability. Regrowth of natural riparian vegetation will also lead to lower width-to-depth channel ratios.
 - c. Conduct land acquisitions and riparian conservation easements where possible and where some measurable benefit to habitat will occur.
 - d. Improve floodplain connectivity and access to side channel rearing habitat.
4. Remove human-caused migration barriers at stream road crossings that are blocking access to potential steelhead habitat.

Valley Creek

1. Increase streamflow and provide screening and passage. Evaluate existing irrigation diversions to assure that diversions bypass adequate instream flow, provide for fish passage, and are adequately screened. Priority streams for increasing instream flow and removing migration barriers caused by irrigation ditches include Elk Creek, Iron Creek, Goat Creek, and lower Meadow Creek.
2. Remove human-caused migration barriers caused by diversion structures and stream-road crossings. Priority streams for barrier removals are Elk Creek, Iron Creek, Goat Creek, Stanley Creek, lower Meadow Creek, and Trap Creek.
3. Restore degraded riparian and floodplain habitat through the following actions:
 - a. Discourage additional development in streamside areas on private lands to avoid degrading fish habitat and floodplain function, particularly on lower Valley Creek within the communities of Stanley and Lower Stanley, and also on Nip and Tuck Creek, Sunny Creek, Iron Creek, and Goat Creek.

- b. Reduce grazing impacts to streams and riparian habitat.
- c. Plant or provide for regrowth of natural riparian woody and hydric vegetation composition, age classes, structure, and pattern in order to restore and maintain streambank stability. Regrowth of natural riparian vegetation will also lead to lower width-to-depth channel ratios.
- d. Modify localized portions of roads and trails along Nip and Tuck Creek and Iron Creek to reduce accelerated contributions to instream sediment, eliminate impairments to proper floodplain function, and restore water quality and geomorphic integrity.

Yankee Fork Salmon River

1. Reconnect floodplain. The highest priority in the watershed is to reconnect the lower Yankee Fork Salmon River to its floodplain. By restoring natural processes to this portion of the river, this river segment could again return to its historical high value as salmonid spawning and rearing habitat. BPA is working with the Shoshone-Bannock Tribes and Simplot, the principle private landowner along the lower Yankee Fork, to begin this long-term project. As part of the Yankee Fork Floodplain Restoration Project, the Shoshone-Bannock Tribes have identified three categories of actions that could substantially improve fish habitat within the lower Yankee Fork: floodplain reconnections, tributary reconnections, and improved fish access to new and existing ponds.
2. Reduce sediment levels. A second priority for habitat recovery actions is to reduce fine sediment delivery to streams. This could be achieved by reducing grazing impacts on streams, reestablishing riparian vegetation, improving bank stability and managing run-off from roads and mining sites. The sediment strategy should include meeting water quality standards to remove the Yankee Fork from the 303(d) list. Measures to protect streams from sediment delivery will likewise enhance bank stability in those areas where this is adversely affecting habitat.

Since this population is currently estimated to be meeting its desired status, no recovery plan actions are directed specifically at the population. However, habitat actions identified for the Valley Creek, Upper Salmon Mainstem, and Yankee Fork spring/summer Chinook populations should also benefit Upper Salmon Mainstem steelhead. These actions are shown in Table 5.3-59

Implementation of Habitat Actions

Implementation for the habitat actions for this population will occur primarily through the efforts of USFS, state of Idaho, Custer County Soil and Water Conservation District, the Upper Salmon Basin Watershed Project, the Shoshone-Bannock Tribes, private landowners, and other stakeholders. Between these groups there is an excellent representation of private, state, and federal entities that manage land and other resources within the watershed. These entities have created an effective process for working together, providing technical reviews of proposed projects, and working with interested parties to accomplish these conservation projects.

Many habitat restoration projects have already been completed in this population. By 2004, an estimated 63 km (39 miles) of stream habitat had been protected through riparian fencing, and 32 km (20 miles) of road or trail have been altered to reduce impacts to stream habitats from sedimentation (NPCC 2004). As indicated by Table 5.3-58 below, the most recent habitat restoration efforts have

included riparian fencing, fish screens, water diversion modifications, water conservation, and fish passage.

Table 5.3-58. Partial list habitat actions that occurred to benefit the Upper Mainstem Salmon River Steelhead Population (FCRPS 2010).

Year	Habitat Improvement Actions
2007-2009	Sediment and Temperature: Riparian Fencing-Mainstem Salmon
	Entrainment; IDFG-Smiley Creek-SSMC-01
	Entrainment; IDFG-Champion Creek-SCHC-03/04
	Entrainment; IDFG-Iron Creek/Salmon Valley SCCIC-07
	Entrainment; IDFG-Goat Creek SVCGC-05/06
	Fish Passage and stream flow; Elk Creek Diversion #2
	Habitat Complexity; Slate Creek Habitat Improvement-4 Reaches treated
	Stream Flow; Fourth of July Creek Improvements in 08 and 09
	Stream Flow; Water lease Alturas Lake Creek-Pivot (2007)
	Stream Flow; Water lease Alturas Lake Creek-Non-Pivot (2007)
	Stream Flow; Pole Creek Water Agreement

Habitat Cost Estimate for Recovery

This population is currently estimated to be meeting its desired status so no recovery plan actions are directed specifically at this population. However, habitat actions identified for the Valley Creek, Upper Salmon Mainstem, and Yankee Fork Chinook population should also benefit Upper Salmon Mainstem steelhead. The habitat cost estimate for the Upper Salmon Mainstem steelhead population is zero.

Hatchery Recovery Strategy and Actions

[to be added]

Harvest Recovery Strategy and Actions

[to be added]

Table 5.3-59. Recovery Actions Identified for the Upper Mainstem Salmon River Steelhead Population.

Recovery Actions Identified for the Upper Mainstem Salmon River Steelhead Population.						
Natal Habitat Recovery Actions [Actions identified for spring/summer Chinook but will also benefit steelhead.]						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020
Upper Salmon River and tributaries	Passage barriers	Address full and partial barriers at diversion structures	1 diversion correction	\$50,000	Unknown	Unknown
	Sediment	Riparian fencing and road system improvements	1 vehicle stream crossing improvement, riparian fencing (improve 4.3 miles)	\$5,000	Possible channel enhancement projects	Unknown
	Streamflow	Acquire irrigation flow by lease or purchase	10 cfs	10*\$100,000=1,000,000		
Valley Creek watershed	Entrainment	Reduce entrainment	Install 6 tributary fish screens (3 projects)	6*\$100,000=\$600,000		
	Artificial barriers block fish passage	Provide fish passage	Open 9 miles of seasonal habitat (2 projects)	2*\$30,000=\$60,000		
	Low stream flow	Increase flow	Remove partial barrier and restore 9 cfs of flow. (2 projects)	9*\$100,000=\$900,000		
Yankee Fork mainstem below Jordan Creek	Lack of functioning floodplain	Reconnect main river channel to floodplain	<p>The Shoshone-Bannock Tribes have identified two different types of actions for floodplain reconnection depending upon existing conditions.</p> <p>a) In those areas where a low area occurs between the river channel and the gravel piles, create a side channel with dimensions comparable to others within the watershed.</p> <p>b) In those locations where gravel piles are continuous from the Yankee Fork road to the banks of the river, create a floodplain bench by regrading existing gravel piles to create a floodplain</p>	Part of estimated \$10,452,000 Yankee Fork Floodplain Restoration Project	None identified at this time	0

			accessible to bankfull and greater flows.			
	Disconnected tributary rearing habitat	Reconnect tributaries to the mainstem river	Restore surface water connections between the Yankee Fork and two of its tributaries, Jerry's Creek and Silver Creek, which were disconnected by mining.	Part of estimated \$ 10,452,000 Yankee Fork Floodplain Restoration Project	None at this time	0
	Lack of off-channel rearing habitat	Create new rearing habitat and increase access to existing rearing habitat	Create new ponds in the floodplain and improve habitat for existing ponds. Modify inlets from the river to existing pond series to convey more spring runoff and summer base flow.	Part of estimated \$ 10,452,000 Yankee Fork Floodplain Restoration Project	None at this time	0
Hatchery Recovery Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020
Harvest Recovery Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020
Predation/Competition Recovery Actions						
Assessment Unit (AU)	Primary Limiting Factor(s) by AU	Necessary Actions	Actions/Projects - 2008 to 2018	Cost for Identified Projects	Actions/Projects Beyond 2018	Project Costs Beyond 2020